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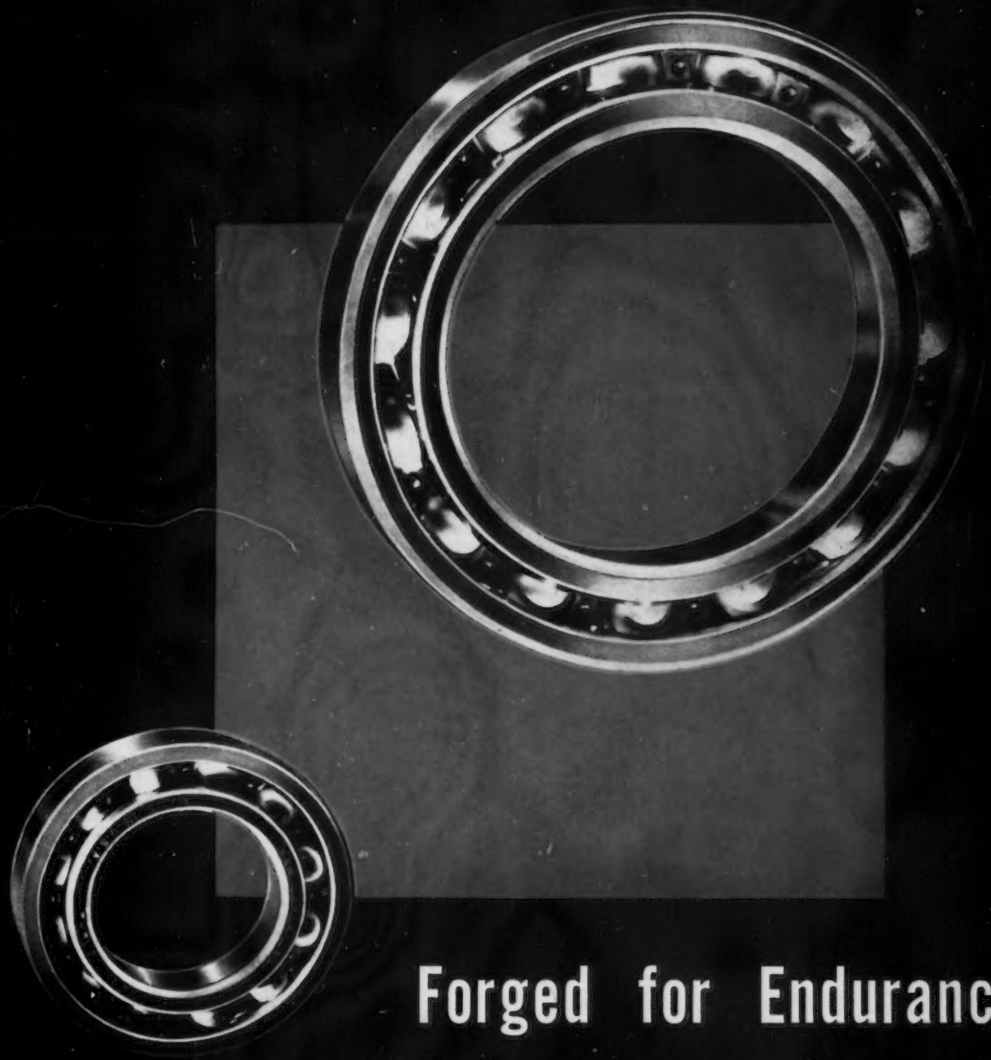

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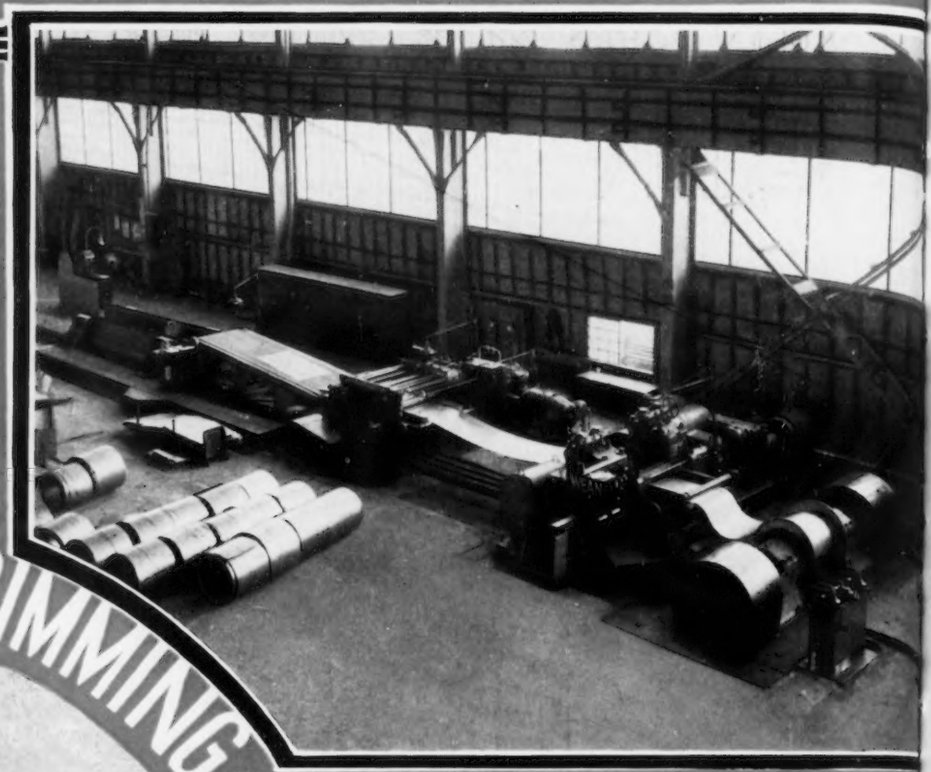

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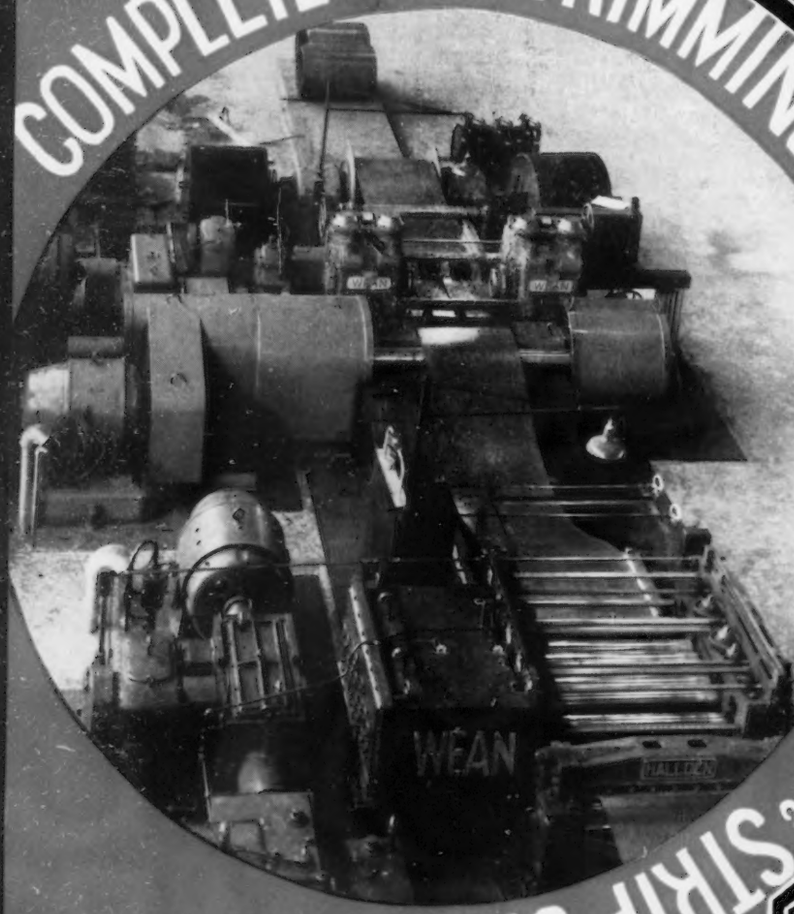

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The Iron Age

JULY 4, 1940

ESTABLISHED 1855

What Price Liberty?

ONE of the ironics of our times is that we are now building the greatest war machine on earth in the hope that we shall never have to use it. We are preparing to spend billions for guns and tanks that we hope will rust and fall apart without seeing active service; billions for bombing planes that we trust will never bombard an enemy; billions for training millions of young Americans for war in the hope that they will never fire a gun at a human target or pierce a fellow man with a bayonet.

Let's ask ourselves why we are doing this. Doing it willingly, yes, eagerly, in spite of our knowledge that the cost of doing it will add severely to the national debt and tax burden and thus to the future burdens of every living citizen.

Why are we doing this? Doing it not merely with the consent but upon the demand of the overwhelming majority of our people, with scarcely a dissenting voice? We are doing it because we have suddenly been awakened to a threat to the American Way of life and also to an appreciation of it.

Not so long ago, there were quite a number of people in our country, some even in high places, who did not appreciate the American Way. Many of them tried to tell us that the Russian way or the European way was superior and that we should junk the old-fashioned form of constitutional government that was handed to us by our founders, and build a modern economy based on regimentation and centralized planning. Indeed, it was quite fashionable to preach against the American Way, and when unruly and vociferous youngsters did so, they were petted and fed from august tables.

Some of them said that the Supreme Court was out of date; that there was nothing like it to hinder progress in those modern countries where one man said "do or die" (and you usually died).

Well, times have changed. People in our country are seeing and thinking more clearly today, because they have been suddenly awakened to realities after being lulled to sleep by rhetoric.

A family may go to sleep at night taking its home and belongings as commonplace and for granted. But when an explosion takes place next door, all members of the family hasten to salvage their possessions.

So it is with the American Way. The American Way that stands for individual liberty. The new schools of totalitarianism have persuaded their people to trade their liberty for so-called social security. France today has social security of a sort since it bowed to Hitler. So have the German and French and Belgian and Dutch and Polish and Norwegian dead.

There have been those in this country who would have us trade liberty for a fictitious social security. Indeed, there have been those so brazen in their effrontery as to make even the lowliest laborer believe that sums extracted from his meager pay were being put aside to provide him security in his old age. When, in fact, every penny thus collected has gone down the rat hole of deficit expenditure.

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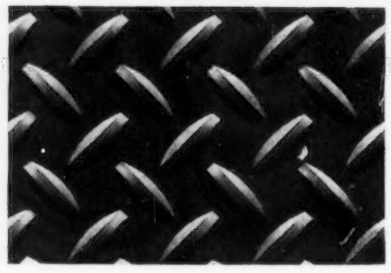

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Chip Curlers for Carbide Tools

o o o

By GAYLORD G. THOMPSON
Madison, Wis.

o o o

A MANUFACTURER who finally succumbs to the alluring possibilities of production economies of carbide tools may be likened to the boy who, after watching the skillful demonstration of the salesman, decided he wanted a Yo-Yo for himself. It all looked so easy to handle. But when he tried to use the Yo-Yo everything went hay-wire. When he appealed to friends who had acquired the knowledge of skillfully handling the toy—how they did it—the usual remark was, "you just got to find out for yourself. Throw it just hard enough TO SUIT, etc., etc."

The manufacturer finds a bunch of carbide tools plunked right into his lap, so to speak. He grinds those tools with the happy optimism of a new convert. And why not? Hadn't he heard how Blank & Co. had such wonderful success with their carbide tools? Didn't they show reductions in manufacturing costs as high as 60 per cent on some jobs? If Blank & Co. can do it, then Mr. Manufacturer can do it. But something went hay-wire! Sure! The tools were sharpened to a nice smooth edge but when they started cutting steel why, them chips just piled up around the machines like hay-cocks. That would never do! The chips might get caught in the revolving machine and fly in all directions and hurt somebody! Chip curlers? Let's see what Blank & Co. do about that.

"We grind chip curlers to a depth and width TO SUIT," is their reply. Then referring to the carbide manufacturer's catalog or recommendations Mr. Manufacturer finds that here too, the instructions are to grind TO SUIT.

Naturally the exasperated manufacturer is going to exclaim, "what in heck is TO SUIT. What are the dimensions? Can't we have a drawing on TO SUIT?"

Well, this article is just a humble offering for the solution of these questions—an offering founded on tried and proved facts on grinding chip curlers on carbide tools—a compilation of data accumulated after months of tests and comparative analysis and which have kept broken tool losses down to less than 1½ per cent. There may be some slight variation where material construction of the part to be machined would require an exceptional change in angles or dimensions. These conditions are few, however, and do not alter the fact that a standardization of data that will cover more than the average requirements for chip curler specifications is an efficient and desirable one.

In the sharpening of carbide tools, it is difficult for the old time mechanic to divorce himself of the ideas he has in the sharpening of high speed steel tools. Old cutting tools were ground with plenty of rake—chips would shear and slide down the rake smoothly, but owing to the comparatively slow cut-feet the chip problem was not acute. Fundamental laws of mechanics as applied to the grinding of high speed steel cutting tools seemed to be violated in the grinding of carbide tools. Then, too, the layman mechanic is inclined to term it "the nuts" not to be able to quench a tool quickly in water when it gets too hot to handle while grinding. And why a special wheel for grinding carbides?

In view of these assumptions it is extremely advisable to have all grinding done by a specialist. It might be appropriate to mention here that inexperienced mechanics, or men who were acquiring training as machine tool operators have proved to be good operators with carbide tools because their very ignorance of old accepted standards and capacities of cutting steel did not stand in the way of their following instructions implicitly. They had not become saturated with the methods of machining with high speed steels so that such knowledge would clash with the apparently unorthodox methods with carbide tools.

Chip curlers play an important part in the life and cutting efficiency of car-

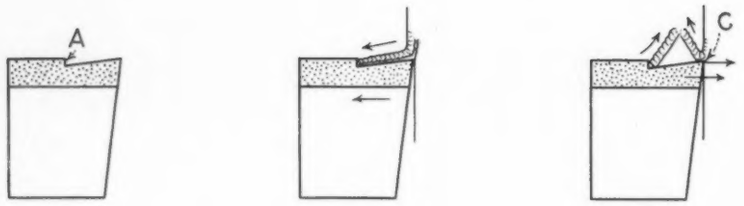


FIG. 1 FIG. 1-A FIG. 1-B

FIGS. 1, 1-A and 1-B illustrate a type of chip curler that is detrimental to carbide tools.

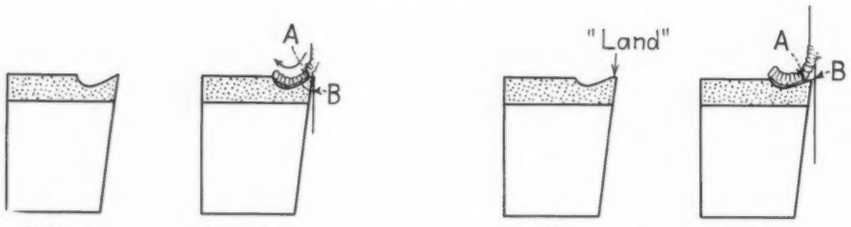


FIG. 2 FIG. 2-A FIG. 3 FIG. 3-A

FIGS. 2 and 2-A—This type of chip curler is not fully satisfactory, but is headed in the right direction.

FIGS. 3 and 3-A—This type of chip curler has given better results than any other type evolved.

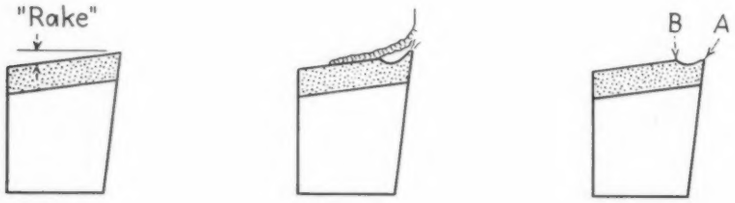


FIG. 4 FIG. 4-A FIG. 4-B

FIGS. 4, 4-A and 4-B showing a top rake on a carbide tool that has certain advantages and is productive of good results.

bide tools. The curlers may be ground too wide so as to have no effect on the tool and chip—or they may be too narrow so that the chip just "leaps the gap" and continues on in a long steely ribbon (see Fig. 4)—or too deep, with the consequent destruction of the cutting edge. Rather than go into wordy detail about chip curlers, it would be advisable to consider some illustrated examples.

The illustrations of chip curlers herein are very much enlarged, perhaps disproportionately so and of necessity slightly exaggerated in order to give an understandable picture of tool and chip action when under working strain. Even with this slight exaggeration in the illustrations, the true fundamental actions of the tool and the chip is not changed.

Figs. 1, 1-A, and 1-B, illustrate a type of chip curler that is detrimental to carbide tools. These illustrations are of the front view of a turning tool. Note the right-angle wall that backs up the chip curler at "A." Now note Fig. 1-A which shows how the chip slides off the work and down the rake of the chip curler until it strikes this wall. When the chip strikes this wall, there is a pressure exerted against the tool which has a tendency to push the tool away from the work as noted by the arrows. If there is any play in the cross-slide or tool-post, the tool point will be pushed away from the work as far as the play will permit. Having reached this maximum, there is an increase in pressure exerted until the chip finally buckles and breaks in the middle, as shown in Fig. 1-B. The tool is thus released from the back thrust and immediately plunges back into the work as denoted by the arrows, but often, not until the downward pressure on the tool point at "C," which is caused by the bending of the chip and the outward pressure, has broken the tip off of the carbide blade. All of this happens during a series of rapid vibrations when the tool is in action. If the tool point is not broken off, the chips pop off the tool and fly in all directions as the tool feeds into the work in rapid jerky motions. The life of this tool is very low and productive of poorly finished work.

A tool of this type was given a work-out on forgings of Hyten B4 steel 24 in. in diameter by 6 in. wide. The chips flew from the tool with singing sounds characteristic of the sudden snapping of spring steel. The chips would land on the floor in their natural color and would then immediately turn to a deep blue of hot steel. The rapidity with which the chips passed from the tool point and snapped to the floor was faster than the discoloring action of the heat stored up in the chip. This excited curiosity but disclosed the error of grinding carbide tools in this manner. The cut-feet however was abnormal, being 596 ft. per min. on a cut ½ in. deep with 0.016 in. feed performed on a Gisholt No. 5L heavy duty turret lathe. The tool broke down due to excessive vibrations caused by the square wall at the back of the chip curler.

Fig. 2 shows another type of chip curler that is fundamentally headed in the right direction. However, as shown in Fig. 2-A, any acute angle of top rake will not take the pressure exerted at "A" to deflect the chip and consequently will break off the tip at the approximate location as shown at "B."

Fig. 3 illustrates the shape of the type of chip curler that has given complete satisfaction over any other type yet evolved. Fig. 3-A shows the action of the tool while in work. Note that the chip as it is peeled off of the work is deflected by the hump at the back of the tool point as shown at "A." (The hump is created by the grinding of a small "land" as shown at "D" in Fig. 6.) This hump removes all strain from the cutting edge of the tool at "B" and leaves this cutting edge to perform the main duty of sizing or smoothing out the roughness caused by tearing away of the chip from the work. The hump at "A" has pretty much the same effect on peeling off the steel from the work as the finger of the human hand does when peeling an orange.

Now as regards the cutting edge at "B" in this same illustration (Fig. 3-A), note that there is a small air space just above the edge of the tool. This air space is caused by the hump of the tool deflecting the chip at "A." This air space is ideal in that the cutting edge does not come in contact

with the material to such an extent as to cause immediate dulling or destruction of the edge. If the "land" was made wider the metal would bear down on the cutting edge of the tool and consequently shorten its life by dulling or breakage. Then too, the class of finish to the work would suffer. If the land was removed entirely, there would be no other result to expect than the immediate break-down of the cutting edge as shown at "B" in Fig. 2-A.

At this point it is well to give consideration to coolants. It is a known fact that a hot carbide tool dipped in cold water is being subjected to complete destruction—like pouring hot water into a cold glass bottle, reversely exampled.

A shank was being ground for clearance underneath a carbide tip and became too hot to handle. The shank was dipped in cold water leaving the carbide end exposed in the air. The tool slipped from the grasp of the worker and fell into the pail of water and when retrieved—the carbide was ruined by a multitude of minute fractures caused by unequaled contractions of the materials that constituted the carbide tip and steel shank.

A lesson can be taken from this as to what could be expected where coolant is used inefficiently during steel cutting operations. When the vital part of the carbide tools is buried under the steel while cutting, it naturally has a high temperature. If the chip should happen to break away and expose for a moment the extremely hot cutting edge of the carbide tool to the coolant, it is reasonable to expect negative consequences. Likewise, if the tool has been cutting for some time and at the end of the cut the tool point is suddenly showered by the coolant, the same result can be expected. This condition is somewhat alleviated where cutting oil is used. The cooling effect is not quite so shocking to the tool.

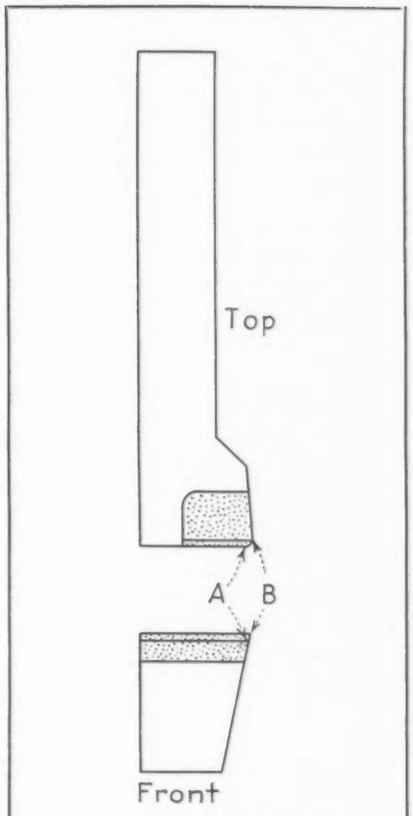
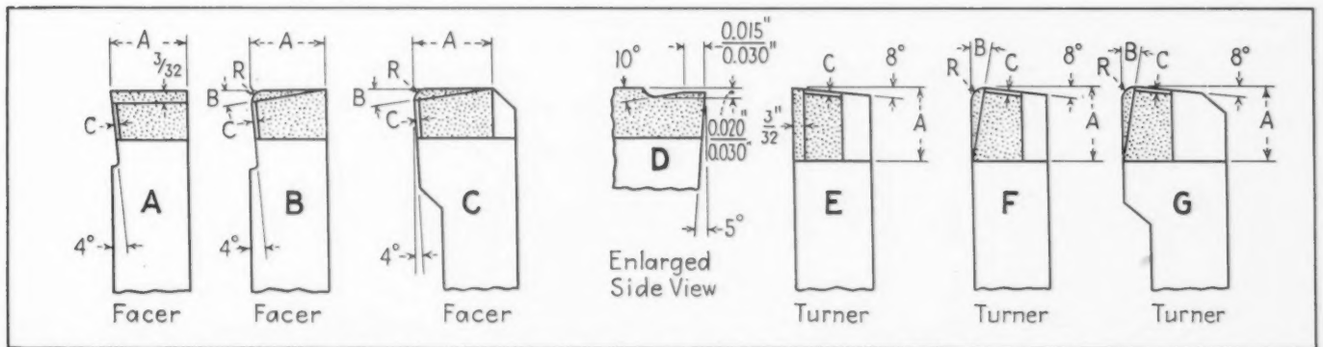


FIG. 5—This facing tool has a radius with a chip curler ground straight with the cutting edge.

Several workers who were having trouble keeping edges from breaking off carbide tools used on Gisholt No. 1L high production lathes, were instructed to remove the coolant from the work—to run the work dry. The supposition was, that the inability to keep the tools flooded because of the nature of the work was destructive to the tool when the coolant finally came in contact with the tool or did so spasmodically. The results of dry cutting were gratifying. The habit of omitting coolant on carbide tools became prevalent among the workers because of the apparently better results obtained. On bar turning machines, however, the old reliable cutting oil is still necessary where roller turner tools are in use.

Top rake on a carbide tool has its



	R	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	C	
	1/64	1/4	7°	3/8	5°	1/2	4°	5/8	4°	3/4	3°	7/8	3°	1	2°									0	
	1/32	1/4	7°	3/8	5°	1/2	4°	5/8	4°	3/4	3°	7/8	3°	1	2°									0	
	1/16	1/4	14°	3/8	10°	1/2	8°	5/8	7°	3/4	5°	7/8	4°	1	4°									1/32	
	3/32	1/4	20°	3/8	13°	1/2	12°	5/8	9°	3/4	7°	7/8	6°	1	6°									1/32	
	1/8	1/4	27°	3/8	18°	1/2	15°	5/8	12°	3/4	10°	7/8	9°	1	8°									1/32	
	5/32	1/4	32°	3/8	21°	1/2	17°	5/8	14°	3/4	12°	7/8	12°	1	9°									3/64	
	3/16	1/4	37°	3/8	27°	1/2	21°	5/8	17°	3/4	14°	7/8	13°	1	11°									3/64	
	7/32	1/4	41°	3/8	31°	1/2	24°	5/8	20°	3/4	17°	7/8	14°	1	13°									3/64	
	1/4	1/4	45°	3/8	35°	1/2	27°	5/8	23°	3/4	20°	7/8	16°	1	15°									1/16	

FIG. 6—Chip curler dimensions for carbide tools which have proved satisfactory.

feature and is productive of good results. But when the top rake on a steel cutting grade of carbide is provided in the milled and brazed condition, there is inconvenience caused by this rake when a chip curler is to be ground. Fig. 4 shows this type of tool, front view. Note that the carbide is brazed in place on an angle for top rake. If a groove is merely ground in place for a chip curler, the cutting edge is higher than the back of the tool and causes the chip to "jump the gap" (see Fig. 4-A). Now then, if the cutting edge "A" is ground down to the level of the rear edge of the chip curler "B," as shown in Fig. 4-B, it can readily be seen that rapid depreciation of the carbide will be experienced because of excessive grinding. The top rake on a milled and brazed tool is excellent and economical where the tool is to be used on cast iron, but if the tool is to be used for cutting steel it is apparently more advisable to braze the carbide blank flat on the shank and take care of the rake with the chip curler, as shown in Fig. 3-A.

An idea that seems to be prevalent is that carbide turning tools should be kept away from jobs that require a radius on the tool for cutting fillets. No doubt much of the trouble encountered with rounded points on carbide tools is due to improper grinding. Especially where chip curlers are involved.

Fig. 5 shows a facing tool having a radius with a chip curler ground straight with the cutting edge. If there was not a radius on the tool, this style of chip curler would be satisfactory. Note that the width of the curler does not extend back of the radius. Note "B" in the top view. The front view shows how this fault aggravates the cutting efficiency of the tool. When the chip curler is ground, it naturally brings the cutting edge in toward the center of the tool, as shown at "A" front view, because of the clearance angle. This leaves the rear portion of the radius still at the original width and deprived of a cuting edge, as shown at "B" both views. The result is that the point "B" will drag across the face of the finished work and roughs it up as if the tool were dull. In other words, the edge "A" is cutting and the point "B" which is left by the grinding of the chip curler, drags over the work with woeful results. The chip curler on a round nose carbide tool should be ground so as to give a back rake as near as possible from every point of the radius. Excellent results have been realized from round nose tools ground in this manner.

Fig. 6 shows a chart compiled from an average of chip-curler dimensions and physical characteristics of materials. This chart is not a universal "cure-all" for chip curler problems but is the boiled down substance of two extremes to form a working average. It provides, as realized by experience, the seemingly correct fundamentals from which further chip curler elaborations can be evolved. In other words, this chart has proved so correct in actual operation that changes to suit special jobs of exceptionally difficult steel are very negligible.

The largest radius as covered by this chart is ¼ in. The larger the radius, the greater the chip curler angle. The chip curler angle is, of course, affected by the width of the carbide also. The view as noted by "D" in Fig. 6 shows the end view of the chip curler and the width of the "land" and the angle of the rake. The letter "C" denotes the grinding away of the extended portion of the tool that would likely rub the surface of the work after the tool point has passed over it. The three tools "A," "B," and "C," are facing tools. The three tools "E," "F," and "G," are turning tools.

The amount of stock that can be removed by tools ground as shown in the chart should not exceed one-third the width of the carbide where radii are involved.

In conclusion, the causes of broken carbide tools are not always due to improper grinding. The machine stopping while a cut is in process, pieces that are being machined coming loose in the chuck jaws, dragging the tool back across the work without first backing it away from the work, or bumping the tool against the work, all contribute to tool mortality. In every case, a broken tool should be investigated and the cause or causes remedied. It is gratifying to note the good results that accrue from taking these precautions. And it should not be forgotten that many costly form tools will automatically be discarded because of the high production capacities of properly supervised carbide tools.

Exposure Tests of Electroplated Ni and Cr

IN 1932, atmospheric exposure tests of plated coatings on steel were initiated by a joint committee of the American Electroplaters' Society, American Society for Testing Materials, and National Bureau of Standards. In 1936, similar tests were started with plated coatings on various non-ferrous metals, and in 1938 these were supplemented with some additional coatings. In the 1936 and 1938 exposures, some new plated steel specimens were also included in order to confirm and extend the earlier observations on steel. A recent paper by W. Blum and P. W. C. Strausser, of the National Bureau of Standards, summarizes the results obtained in these tests since 1936. While some of the specimens may be exposed for longer periods, especially in the milder locations, it is believed that subsequent observations upon them will not materially alter the conclusions based upon the exposures up to the present time.

(1) The most important factor in the protective value of nickel-chromium coatings on steel, brass, or zinc is the thickhess of the nickel coatings.

(2) On steel or zinc, a layer of copper under the nickel adds little to the protective value of thin coatings. With thick deposits, the protective value of the composite coating approaches, but does not exceed, that of a nickel coating of the same total thickness.

(3) Variations in the methods of preparation and of nickel plating, which included the use of four bright nickel solutions supplied in 1938, had no large effects upon the protective value of the coatings.

(4) Variations in the thickness of the chromium coating from 0.00001 to 0.00003 in. applied over nickel have very little effect, but if it is 0.00005 in. or more, cracking is likely to occur, especially over nickel coatings on brass.

(5) Variations between basis metals of a given group have no large effects. A greater thickness of nickel is required to furnish a given degree of protection on zinc than on brass, and greater on steel than on zinc.

TIN

o o o

By ADOLPH BREGMAN
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IN food distribution, in housing, in printing, in industry and the arts, tin has become one of the most important of commercial metals

TENTH of a series of articles dealing with "The Right Metal in the Right Place", designed to aid manufacturers in selecting the most suitable non-ferrous metal or alloy for their products.

o o o

THE physical properties of tin as a metal are of practical importance to industry in only a few respects as almost all of its uses call for it in the form of thin coatings or alloys. However, some of its attributes have an important bearing on the qualifications of the mixtures in which it plays an important part.

Tin is one of the very high purity metals. The highest purity commercial tin runs 99.9 + although tin of 99.987 purity is available commercially at a premium and tin with a purity as high as 99.9999 + has been reported. Tin is a white metal with a specific gravity of about 7.3 and a melting point of 232 deg. C. (450 deg. F.). Its tensile strength is low, about 2000 lb. per sq. in., and its elastic limit, about 200 lb. per sq. in. Brinell hardness is about 5. It is very ductile and plastic, but is hardened and embrittled by additions of small percentages of other metals, such as antimony, copper, iron, bismuth, silver, etc.[1] It is impervious to light rays, moisture and volatile constituents.

An extremely important physical property is its low surface tension in the molten state, its ability to wet other metals, which accounts in considerable measure for its success in its major use today, tin-coated steel.

As those metals wet each other which form solid solutions or compounds with each other, tin forms compounds with iron: $FeSn_2$, Fe_2Sn and FeSn.[2] The tin-iron layer or compound in tin plate is approximately 0.00002 in. thick, in a coke tin plate the coating ranges from about 0.00006 in. (1 lb. per base box) to about 0.00015 in. (2.5 lb. per base box). Annealing the tin plate increases the percentage of alloyed tin and the size of the $FeSn_2$ crystals.

One of the most valuable advantages of tin is its ease of fabrication. Its softness, its low melting point and its miscibility with many other metals make it available for casting, rolling, extrusion (cold), spinning, stamping, drawing, forming, etc. It can be cast without difficulty in metal molds of steel or bronze, for example, as type in the linotype machine, and in a million varieties of novelties and jewelry; either under pressure or by hand-pouring in permanent mold castings.

Perhaps the most interesting illustration of its ease of workability is the well known process of forming collapsible tubes. A disk of tin is placed in a die and struck a sharp blow by a cylindrical tool. Most of the metal is squirted by the force of this blow through the annular space between the cylindrical tool and the die and up the wall of the tool, thus automatically producing a tube. A part of the tin remaining in the die is at the same time formed into the shoulder and nozzle of the tube.

Chemical Properties

The outstanding chemical property of tin is its ability to resist attack by air and many organic chemicals, including those of food products. It is resistant to a whole range of acid

[1] The physical properties of tin are given in great detail in the Metals Handbook for 1939 in the section entitled "Physical Constants of Tin" by C. L. Mantell, which includes an extensive bibliography. Another valuable reference is "The Properties of Tin," compiled by E. S. Hedges and C. E. Homer, for the International Tin Research and Development Council.

[2] From "Protective Coatings for Metals" by Burns and Schuh, 1939.

media. In many cases it may be attacked by these acids with the displacement of hydrogen, but in the absence of oxygen the attack ceases due to the high hydrogen over-potential—retaining a film of hydrogen atoms on its surface which retards further attack. If oxygen is present, however, it removes the hydrogen by combining with it to form water and the attack proceeds.

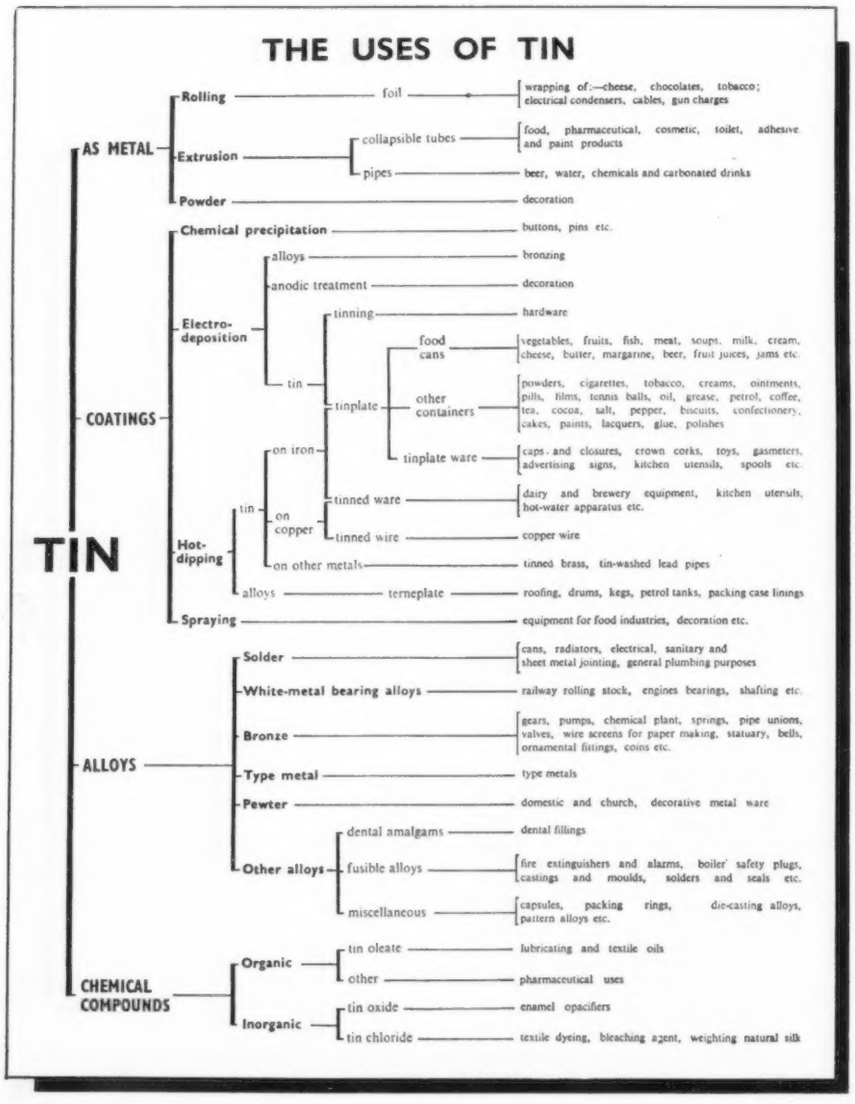
Moreover, in many cases (even where some attack occurs in the presence of small amounts of oxygen) the products of the reaction between tin and foods are innocuous to the human system in the small quantities in which they may exist.

Tin is rapidly attacked by strong alkalies and ordinary inorganic acids under exposure to air.

Applications

In discussing the uses of tin, it is necessary to consider its various manufactured forms, as shown in the accompanying table, furnished by International Tin Research and Development Council. As employed today, tin appears as (1) solid metal ("block tin"); (2) coatings (tin plate); (3) alloys; (4) chemical compounds.

Both as a solid metal and as a coating, its supreme function is for contact with food, drink, confectionery and other products for human consumption. Its use as a solid metal is naturally restricted by its cost, but it is widely installed in the form of pipes made by extrusion, in breweries, bottling works and chemical plants. Because of its ability to retain moisture and keep out light, another considerable use in solid form, though very thin, is as foil and collapsible tubes for wrapping and containing food, confectionery, pharmaceuticals, cosmetics, adhesives, paint products, tobacco, electrical condensers, cables, gun charges, etc. It is also used in powdered form for decorative purposes.



An important variation in the application of metallic tin is to use it in combination with other, cheaper metals, in such fashion as to make use of its protective properties at minimum expense. So, for example, we have containers in which the main body is lead with a thin layer of tin on the outside or inside, as the case may be, for contact with the chemicals or other materials handled. Other examples are tin-lined copper and brass tubes for protection against attack by certain waters and by distilled water in steam condensing systems. It is also used in the dairy industry as a coating for copper vessels; in pasteurization; in refrigeration; for carbonated water; on sheet copper for roofing, etc. An unusual example recently noted is a butter mixer with a cast iron body and an electroplated coating of tin from 0.003 to 0.009 in. in thickness, using the sodium stannate solution.

Another interesting place for tin is as a coating for copper conductor wires in the electrical industry, preventing reaction between the copper and sulphur in the rubber insulation, and consequent deterioration.

Tin's primary use, as a coating for steel sheets, rests upon four essential properties: (1) its ability to resist the attack of the food products and other materials contained; (2) the ease of applying the tin coating; (3) the easy closing or sealing of the container by soldering; (4) its resistance to atmospheric corrosion and retention of a pleasing luster.

One of the most important elements in the success of the tin-lined container in preserving foodstuffs is that when they are introduced into the can, most of the oxygen content is displaced by steam, and that when the can is sealed and cooled, a partial vacuum results. As noted above, after a brief attack on the tin by the acids in the products contained in the can, the hydrogen film on the surface reduces the subsequent attack to a negligible amount. For that reason, freedom from pores in the tin coating on the inside of the can is much less important than on the outside.

Another important use for tin plate based on its attractive appearance is as a printing medium. Tin plated sheets allow the full use of color printing, lithographing, for decoration, advertisement and design in practically unlimited variety.

Although the overwhelming proportion of tin plate carries a very light coating, some grades are made for

special service with deposits up to 0.001 in. to resist severe corrosive conditions or for long use. For example, the gas meter, which is made largely of tin plate, functions without deterioration for years. Another special type of coating is what is known as terne plate, where a tin-lead alloy is coated on steel sheets. The tin varies from 12 per cent to 50 per cent of the coating which is extremely heavy, and the terne plate is used for roofing and similar severe work, such as cans for lubricating oil, stamped articles, etc.

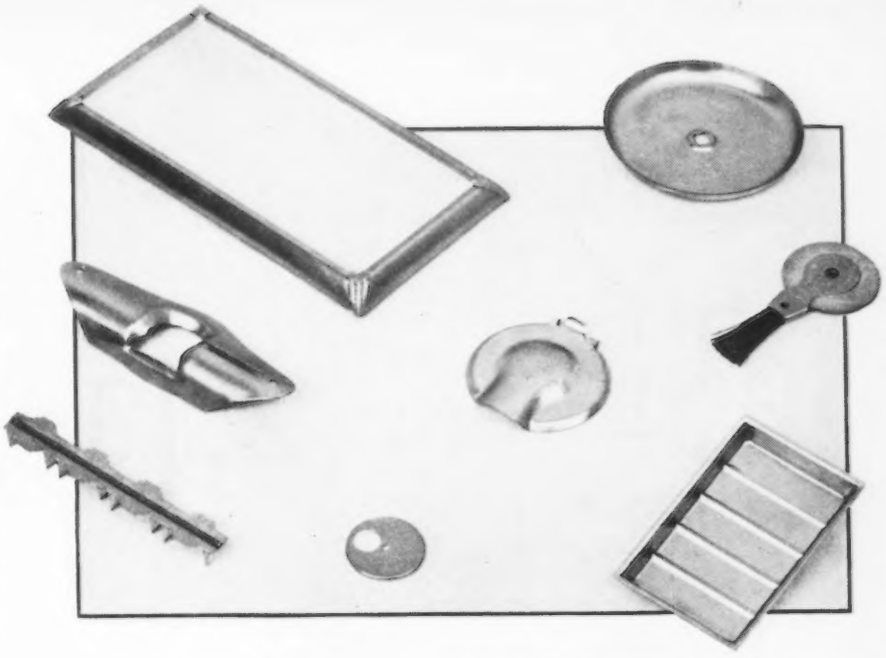
Important improvements have been made in more recent years in the methods of applying tin coatings. The metal may be sprayed by blowing molten tin with a spray gun onto the object to be coated, by means of an oxy-hydrogen flame applied to the metal wire. This method has the advantage of availability for coating large and complicated pieces *in situ*, but it also serves well for special decorative treatments on non-metallic as well as metallic surfaces.

Still another method of obtaining a tin coating is by chemical precipitation (the "contact" process) in solutions of cream of tartar and salt, for example. Literally, billions of small articles, like pins, buttons, etc., are coated with tin in this fashion, not only for protection but for its pleasing appearance. Necessarily, such coatings are very much lighter than even the thinnest hot-dipped coating.

A method which is steadily approaching commercial use is the application of tin on strip by electrodeposition. Both acid and alkaline baths are being tested in different mills and, although details are not publicly available as yet, there is general agreement that electro-tinning is due to become practical on a production scale at no distant date.

Tin Scrap

No material as high in cost as tin is discarded, even after it has lost its usefulness in its fabricated form. Parts made of block tin or tin alloys are easily salvaged by remelting and alloying. Tin foil is similarly recoverable although it requires more care than heavy metal to prevent excessive oxidation, drossing, etc. Tin plate, however, is obviously a much more difficult problem. Out of the hundreds of methods covered by patents only a few are in commercial operation. The most important are (1) electrolysis, in a solution of sodium hydrate and an oxidizing agent and (2) treatment with dry chlorine. In the electrolytic method the resultant products are pure tin, with the iron suitable for remelting. The dry chlorine method produces tin tetrachloride for the silk industry and other uses.



TIN plate in a few of the thousands of novelty forms in daily use. Photo courtesy of Apollo Metal Works.

Summary

Tin, fully as much as any other metal and perhaps in many ways more so, has been an outstanding contributor to the advance of civilization. It has made possible the production of cheaper and more universally distributed food by making food storage safe and economical in tin coated containers. In housing, tin is indispensable in the form of solders for plumbing and sanitary installations. As tin-base alloy type, producible in automatic casting machines, it has been one of the leading forces in making printing cheap enough to be available to the masses and so facilitating the reduction of illiteracy during the last century.

In industry the tin base bearing or Babbitt metal moved power transmission a long jump forward. Tin base alloy solders have made metal products manufacture possible in millions of items. In bronze bearings for machine parts, in bronze for chemical plant equipment, in bronze wire screens for paper making, it has formed a vital cog in the industrial wheel.

In the arts, tin in bronze for statuary and church bells, in pewter for domestic and other forms of decorative metal ware, has done its full share.

Tin's future, as far as it is visible, seems to rest upon the future of general industry. At this time important new uses or outstanding new forms of tin, are not apparent. There are occasional excursions into new fields, like, for example, the recent use of tin as an electroplate on automobile pistons. However, in the main, its progress will be rather along the lines of expansion of present uses for food, housing, printing, industry and the arts.

TABLE I

Consumption of Tin in the United States in 1937, by Finished Products (Tin Content) in Gross Tons *

	Primary	Secondary	Total
Tin plate	39,221	——	39,221
Terne plate	382	1,015	1,397
Solder	12,026	7,832	19,858
Babbitt	4,501	2,272	6,773
Bronze	3,712	2,784	6.496
Collapsible tubes	3,571	†	3,571
Tinning	2,585	67	2,652
Foil	1,456	4	1,460
Chemicals (other than tin oxide)	171	1,331	1,502
Pipe & tubing	1,278	18	1,296
Tin Oxide	793	411	1,204
Type metal	221	1,140	1,361
Galvanizing	997	†	997
Bar tin	652	174	826
Miscellaneous alloys	482	24	506
White metal	374	33	407
Miscellaneous	506	97	603
Total	72,928	17,202	90,130

*From Minerals Year Book, 1939.
†Small quantity included under "Miscellaneous."

CASE HARDENING *in* LIQUID BATHS

By F. D. WATERFALL
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SALT bath case hardening methods used in the United Kingdom are different from those in the United States, and success with such methods has been very pronounced abroad. These methods are critically examined by the author herein. Last week, attention was directed to depth and hardness, brittleness as related to case hardness, cyaniding temperature, etc. Herein, in conclusion, descriptions are given of core properties of steel treated in cyanide, case hardening of malleable iron, distortion, cyanide bath economics, etc.

CORE PROPERTIES OF STEEL TREATED IN CYANIDE: Sometimes it is found that mild steel parts lightly cased in cyanide at a relatively low temperature fracture easily and show a brightly crystalline core. It has been said that nitrogen from the cyanide bath penetrates during treatment into the core of the piece and produces brittleness in the same way as embrittlement in pickling is produced by hydrogen. This is a most unlikely explanation. The reason for the brittleness is almost certainly related to the steel structure before treatment.

From very many analyses, it has been shown that carbon penetrates further into the steel during cyanide carburizing than does nitrogen introduced at the same time (see Tables I and II, last week) indicating that the nitrogen picked up during treatment in the cyanide, remains in the *case*. If small parts are made from annealed or normalized mild steel having a coarse structure of ferrite grains surrounded by pearlite envelopes, then the crystalline fracture can easily be produced by low temperature treatment during cyaniding, say at 780 to 800 deg. C. (1436 to 1472 deg. F.). At this temperature the pearlite (0.9 per cent C.) in the core transforms to austenite and on quenching the original coarse grain is retained. The ferrite in small sections is now surrounded by martensite (0.9 per cent C.), which on account of its brittleness and position around the grain results in brittleness and crystalline fracture in the piece treated, since fracture follows the martensitic areas. The original coarse grained piece was not markedly brittle because of ductility, particularly *in the surface layers of ferrite*, coupled with moderate ductility of pearlite. When surface ferrite and pearlite are replaced by a hard case and pearlite in the core is replaced by hard martensite, distinct brittleness is obtained. Table VI gives results on steel coarsened at 900 deg. C., cooled in sand, then reheated and water quenched from the temperatures indicated.

Table VI shows that coarse grained pieces reheated to 770 deg. C. (1418 deg. F.) and water quenched are very brittle. Elevation of the reheating temperature to 800 to 830 deg. C. produces improved impact figures. The martensitic areas are now softer and more widely distributed due to increased solution of ferrite by the original austenite as the temperature increases. Examination of the fractured pieces indicated, however, that increased resistance to fracture of pieces quenched from 800 to 830 deg. C. was mainly due to plastic deformation of the metal at the root of the *notch*, and when once a crack formed by rupture of the metal in this vicinity it continued easily across the remainder of the section. This suggested that if a case had been applied to the specimens, little improvement in impact would be obtained by elevation of the quenching temperature from 770 deg. C. (1418 deg. F.) to 800 to 830 deg. C. (1472 to 1526 deg. F.).

The results shown in Table VII were on pieces carburized in *the pack* to 0.025 in. approximately, slowly cooled and reheated at the temperatures shown. It can be seen that when pieces are coarsened during carburizing and then given a single reheat with a water quench, improved impact figures are *not* obtained until the core has been refined and that intermediate

temperatures of 800 to 850 deg. C. (1472 to 1562 deg. F.) do not produce improved impact resistance. These results, although produced on pack hardened pieces, can quite well be applied to cyaniding. Steel with coarse grain and pearlite envelopes around the grain should not be cyanided at 760 to 850 deg. C. (1400 to 1562 deg. F.) when good core properties are required. Such parts should be cyanide hardened at 900 deg. C. when refinement of the core will be effected.

It should, however, be remarked here that steel with carbon content above the upper limit of S.A.E. 1015 steel should not be quenched from the higher temperatures into water when good ductility is required in the core.

An example will best illustrate the point. Steel pieces 7/16 in. in diameter, analyzing 0.23 per cent C., 0.60 per cent Mn, nickel nil, Chromium <0.01 per cent, were rather coarse grained. When treated for 20 min. in cyanide at 780 to 800 deg. C., and water quenched, a brittle fracture resulted for the reason mentioned above. If cyanided for 20 min. at 850 deg. or 880 deg. C. (1562 deg. or 1616 deg. F. respectively), followed by water quenching, brittleness was then obtained due to too high a core hardness, although fine fractures were obtained, particularly in the 880 deg. C. specimen. When specimens were oil quenched from the same temperature (850 to 880 deg. C.) the core hardnesses were satisfactorily low and ductility satisfactory. It is therefore advisable when cyanide hardening this higher carbon material at 850 to 880 deg. C. (1662 to 1616 deg. F.) to quench in oil for hardening. Alternatively, pieces could be oil quenched from 850 to 900 deg. C., reheated to 780 deg. C., and water quenched, when the core hardness is much lower than by a direct water quench from 850 to 900 deg. C. Core hardnesses when water or oil quenching from the various temperatures are shown in Table VIII and graphically in Fig. 9.

Several years ago a British Government metallurgical department examined the response of various alloy steels to case hardening in cyanide and the box. The three types of steel used were approximately equivalent to S.A.E. 2315, 2515 and Krupp. Results are set out in Table IX. Pieces of each steel were carburized to the same depth in cyanide and the box, all being refined and hardened in the conventional manner, details of which are shown. Some of the Izod test pieces had been machined to finish size so as to observe the effect of the hard cases

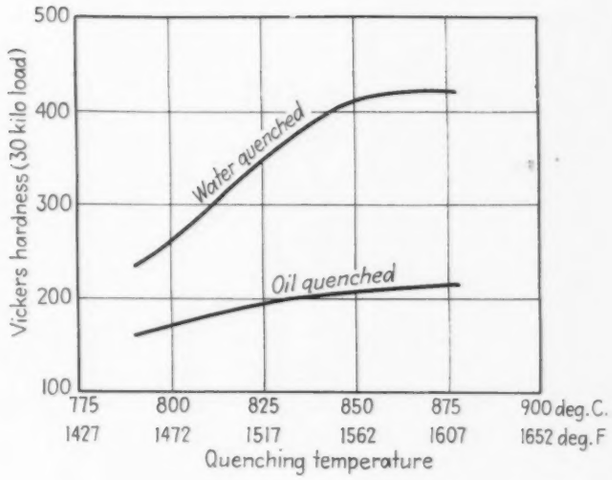


FIG. 9—Variation in core hardness with quenching temperature, for water and oil quenching.

produced by the two methods. It can be seen from the table that test pieces of a given steel show similar properties when treated by either method. Moreover impact specimens to which a case was applied gave equivalent results for cyanide and box carburizing indicating that the case produced by the former method is not more brittle than by box carburizing. The low case hardness of Krupp steel is most likely due to retained austenite.

Case Hardening Malleable Iron

Considerable quantities of whiteheart malleable iron are now being case hardened in 40 to 50 per cent cyanide baths. Due to the method of manufacture, the casting has after annealing a relatively thick ferritic band on the outside and this has poor wear resistance. The surface hardness is greatly improved by a treatment for 30 min. at 900 to 950 deg. C. in the cyanide bath to give 0.015 to 0.02 in. case, followed by air cooling and a reheat to 800 deg. C., with an oil quench. Surface hardnesses of thin sections reach 700 V.P.N. and surfaces of thicker sections rather less, but generally above 400 V.P.N. The whiteheart iron must be fairly well

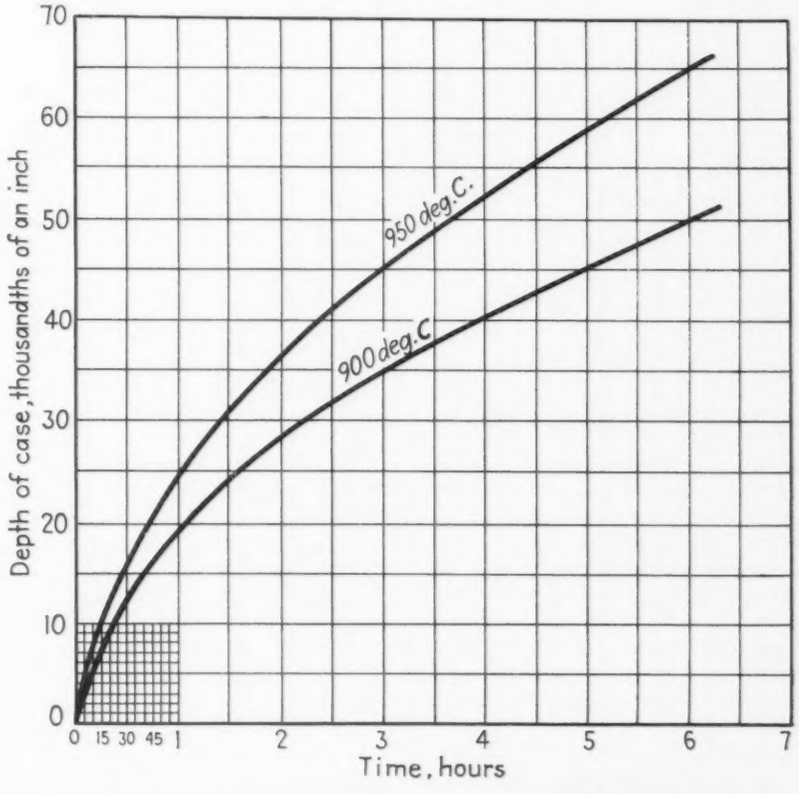


Fig. 10—Time-penetration curves for alkaline earth chloride bath.

TABLE VI

Variation in Impact (S.A.E. 1015 Steel) After Water Quenching

Prior Treatment	Reheated to	Quenched in	Izod Impact, Ft.-Lb.	Maximum Stress, Tons Per Sq. In.
4 hr. at 900 deg. C. and cooled in sand.	770 deg. C.	Water	4	39
	800 deg. C.	Water	20	41
	830 deg. C.	Water	39	40
	900 deg. C.	Water	50	37.5

TABLE VII

Variation in Impact Strength for Pack Carburized Specimens (S.A.E. 1015 Izod Pieces Machined to Size Before Treatment)

Carburizing (In Pack)	Reheated to	Quenched in	Izod Impact, Ft.-Lb.
To 0.025 in. at 900 deg. C. and slowly cooled	760 deg. C.	Water	1
	780 deg. C.	Water	1
	800 deg. C.	Water	1.5
	850 deg. C.	Water	2
	900 deg. C.	Water	11*

* This piece received a further reheat to 770 deg. C. and water quench.

TABLE VIII

Core Hardness for Steel (0.23 C, 0.60 Mn) After Water and Oil Quenching

Heated for 20 min. in 45 Per Cent NaCN to Temperature Shown	Vickers Hardnesses on Core (30-Kilo Load) Water Quenched	Oil Quenched	Fracture of Water Quenched Specimens	Remarks
780 deg. C.	234, 235	162, 165	Brittle	
800 deg. C.	258, 265	168, 169	Brittle	
850 deg. C.	402, 420	211, 205	Brittle	
880 deg. C.	415, 422	210, 218	Brittle	
880 deg. C.	205 – 215		Tough	This specimen oil quenched. Reheated 780 deg. C. and water quenched.

annealed, otherwise excessive core hardness and brittleness is met, but some resolution of temper carbon is usual.

Blackheart malleable cannot be treated in the manner just described because of the excessive carbon resolution, resulting in core brittleness. A very thin hard skin can, however, be produced by immersing for an hour or more in a cyanide bath (40 to 70 per cent NaCN) at 600 to 650 deg. C., followed by water quenching.

Distortion After Case Hardening

Parts water quenched after application of a shallow case at 830 to 900 deg. C. are sometimes found to have expanded, generally making bores and holes oversize. Occasionally parts have been scrapped for this reason. Similar parts free from case expand slightly or not at all when quenched from the same temperatures. It has been found by experiment that components with shallow cases are more prone to the expansion trouble. As the case depth is increased the tendency for expansion becomes less, until with a depth of case governed by the component in question *shrinkage* instead of expansion occurs on water quenching from 850 to 900 deg. C. It is sometimes found too costly to carburize to a sufficient depth to allow quenching in water from say 900 deg. C., without bore expansion. It is then advisable to increase the depth of case 50 to 100 per cent, oil quench from the carburizing bath and reheat to 780 deg. C., and water quench. Less expansion will be obtained with a 780 deg. C. water quench than with a 900 deg. C. water quench.

The high rate of heating of salt baths sometimes tends to cause a certain amount of distortion on slender parts. Such should be heated to 350 to 400 deg. C. before immersion in the carburizing bath, the latter being maintained at a relatively low temperature of 800 to 830 deg. C. and quenched in oil, provided a high case hardness is not essential. Better hardnesses can be obtained by carburizing at 900 deg. C., the temperature being allowed to fall to 800 deg. C. before quenching in oil.

Relatively high strength cyanide baths, of approximately 50 per cent NaCN, run at relatively high temperatures, are of course more expensive to maintain than lower strength baths operating at lower temperatures. The use of a carbonaceous covering does however help matters greatly; indeed, it would not be possible to work the high temperature (950 deg. C.) high strength bath economically without the covering. The more effective the covering in reducing access of air to the surface of the salt, the lower is the cyanide consumption. The development of coverings having greater efficiency will be an aid from the economic aspect, since the greatest fall in bath strength comes from atmospheric oxidation and not from breakdown of cyanide in contact with clean steel immersed in the bath. Some air is, however, necessary for carburization of steel in cyanide to take place, so it would be useless to seal a bath hermetically.

A 50 per cent NaCN bath operating at 950 deg. C. requires additions of 2 to 2½ per cent of its weight of 98 per cent NaCN per hour to maintain the strength when working under a carbonaceous covering. There are two ways of reducing this consumption apart from the question of efficacy of carbon covering, (a) reduce the bath temperature, (b) reduce the maximum bath strength. Both can be done when parts have only to receive, say, 0.005 in. case so that large quantities of work are heated to 900 deg. C. in 40 per cent NaCN, given a 5-min. soak and quenched in water. The 0.005-in. case will be got partly during heating and partly by soaking at 900 deg. C. It is only necessary to use the high temperature of 950 deg. C. when depths of case 0.015 in. or more are desired, but loss of output is experienced when a case of 0.005 in. is applied at temperatures much below 900 deg. C.

A 30 per cent NaCN bath is, of course, more economical to run than one analyzing 40 or 50 per cent NaCN. If only a hard skin on steel is desired, it is satisfactory. Frequently, however, small firms use a single bath for surface hardening and application of deeper cases, and then with the lower strength baths the depth hardness suffers, as can be seen from Fig. 2 (shown last week).

When regenerating the higher strength baths the salt going in is generally greater than the dragout, necessitating removal of some of the melt before regeneration, if the bath level is to be maintained constant.

Fifty and 40 per cent NaCN baths are regenerated with 98 per cent NaCN, and 30 per cent baths are regenerated with 98 per cent NaCN, or 75 per cent NaCN salts. Sometimes baths of lower cyanide content than 30 per cent NaCN are in use for skin hardening S.A.E. 1015, heat treating alloy steel, or reheating carburized steels. These baths are best replenished with the 75 per cent salt since this usually contains chlorides, which help fluidity in baths of low cyanide content. The use of 98 per cent NaCN for this purpose results in higher carbonate content than with 75 per cent NaCN for any given cyanide percentage.

A 43 to 45 per cent NaCN salt sometimes finds use for reheating carburized work. Simply making up drag-out in normal working (at say 780 to 850 deg. C.) under a carbonaceous covering will usually be found to maintain 12 to 15 per cent NaCN in the melt, and fluidity is satisfactory.

Alkaline Earth Chloride/Cyanide Baths

There are only two main types of carburizing salt baths in use in Britain. Little is known of production working with such baths as those regenerated with HCN polymer.

The cyanide bath has a decidedly better fluidity than the alkaline earth chloride/cyanide baths. This is a marked advantage in some instances, particularly where only one salt bath furnace is installed and where a variety of treatments, such as casing to depths of 0.035 in., light casing of alloy steels, or hardening tool steels is being carried out.

Moreover cyanide is decidedly more soluble in water than alkaline earth chloride salts, which is an important factor when washing parts after oil quenching from the salt bath, particularly if salt is trapped in small holes.

On the other hand baths *high* in alkaline earth chloride, e.g., composition (B) below, confer a given case depth at a specified temperature in shorter time than do the high cyanide baths (50 per cent NaCN). Moreover, with the former the proportion of glass hard zone in the case will be increased. The high alkaline earth chloride bath is also more economical to use. It is described below.

Two types of bath are used: (A) alkaline earth chlorides 30 to 40 per cent, sodium cyanide 15 to 20 per cent; and (B) alkaline earth chloride 50 per cent approximately, Cyanide 10 to 12 per cent. The balance of the two baths consists of alkali chlorides and carbonates.

These baths are covered with a carbonaceous layer to conserve bath strength, reduce heat losses from the bath surface and prevent fume. Cyanide is, of course, essential for carburization to take place. As in the case of straight cyanide baths, there is no evidence that the carbonaceous covering enters into the carburizing reaction.

Bath (A) when correctly regenerated gives results intermediate between low strength (30 per cent NaCN) cyanide baths and baths of composition (B), and approximately equivalent to high strength cyanide baths when operating under similar conditions.

A time-penetration chart of baths of composition (B) is shown in Fig. 10. The glass hard part of the case (on mild steels after refining and hardening) is 50 to 60 per cent of the total depth. This type of bath is tending to replace pack carburization up to 0.08 in. in various branches of engineering, including automobile, machine tool and the heavy industries. The case depth which can be applied is not, however, limited to 0.08 in. Indeed, case depths of 0.160 in. are being frequently applied by such baths to Diesel engine camshafts. The case produced is of approximately eutectoid composition.

For uniform working, regeneration of the bath is carried out daily by adding alkaline earth chlorides and cyanide, the addition of the cyanide being governed by cyanide test of the bath.

When parts of a component are desired soft, "stopping off" can be done by copper plating the required thickness of copper depending on the time of immersion in the bath. (The copper must have good adhesion and be non-porous.) Required copper thicknesses are shown in Table X.

Frequently the ordinary cyanide bath is used for heat treating parts carburized in the bath of composition (B), but if necessary heat treatment can be carried out in these baths down to a temperature of 770 deg. C. (1418 deg. F.).

TABLE IX

Response of Alloy Steels to Cyanide and Box Hardening

Type of Steel Cased In	S.A.E. 2315 Cyanide, 50 Per Cent NaCN Approximate	S.A.E. 2315 Box	S.A.E. 2515 Cyanide, 50 Per Cent NaCN Approximate	S.A.E. 2515 Box	KRUPP Cyanide, 50 Per Cent NaCN Approximate	KRUPP Box
Refining Treatments	860 Deg. C. and O.Q. 770 Deg. C. and W.Q.		830 Deg. C. and O.Q. 740 Deg. C. and O.Q.		830 Deg. C. and O.Q. 760 Deg. C. and O.Q.	
Core Specimens						
0.1 Per Cent Proof Stress, Tons Per Sq. In.	25.5	25.2	26.8	27.0	42.7	46.9
Ultimate Stress, Tons Per Sq. In.	54.8	55.0	47.2	48.2	87.0	89.5
Elongation	25	26	37	38	19	19
Reduction of Area, Per Cent	57	57	65	65	51	54
Izod Impact, Ft.-Lb.	55, 56	60, 58	74, 78	74, 77	42, 42	41, 41
Cased Specimens						
Depth of Case, In.	0.023	0.023	0.022	0.031	0.022	0.022
Izod Impact, Ft.-Lb.	19, 19 19	19, 19	25, 27 26	25, 27 26	11, 11 11½	10, 10½ 9½
Vickers Hardness	798	822	742	752	536	505

TABLE X

Copper Plating Necessary for Stopping Off

Case Depth Required, In.	Time in Bath (B) at 950 Deg. C.	Copper Thickness Required, In.
0.02	45 min.	0.00025
0.03	1½ hr.	0.005
0.04	2½ hr.	0.001
0.05	3¾ hr.	0.0015
0.06	5¼ hr.	0.002
0.06 up to 0.12		0.0025

Placing a Plating Contract

Guessing bidders and loose specifications result in a queer collection of figures

By ADOLPH BREGMAN
Consulting Engineer, New York

SOME time ago a certain State Commission found itself with a good sized lot of miscellaneous plumbing fixtures and hardware which needed re-plating, due to wear, tear and other natural causes. This commission compiled a list of the fixtures and sent out a request for estimates to a considerable number of electroplaters in its vicinity. In due time, the sealed bids were received and opened, and they read as shown in Table I.

In order more clearly to illustrate this "divergence of ideas", Table II lists the bids of platers A, E and K, item by item.

At the first glance this aggregation of estimates, guesses, or what have you, would stagger any statistician. The party placing the work might even be tempted to toss them all into the waste basket and start afresh. However, an analysis of these bids discloses enough reasons for the variation in prices to teach an object lesson in, "What is wrong with American Industry?"

Note first of all, that bids A, B and C, are all in the "low bracket"; D, E, F, G, H and I are grouped quite closely together in the middle range; J and K are high, and L is astronomical.

Why? Were six platers out of 12 crazy? Many manufacturers would say unhesitatingly—yes! But that is hardly the whole truth.

It is instructive, therefore, to look at the specifications, as quoted below:

"All wrench and hammer marks or other scars to be ground smooth. All existing chromium plating to be removed. All foreign substances to be removed with acid solution baths. All parts and pipes to be copperized before plating and receive one heavy coat of nickel and one heavy coat of chromium, and be buffed smooth before each plating and polished after chromium plating.

"Work to be guaranteed for two years against stripping, and to withstand exposure to sea and shore atmosphere."

The first sentence is clear; it means that the plater must grind out all existing imperfections. The amount of work involved depends entirely upon the condition of the parts and this can be checked only by a good inspection before estimating. "All existing chromium plating to be removed," means stripping; and the same applies to the "removal of foreign substances with acid solution baths."

But note the next sentence which calls for a "heavy" coat of nickel and a "heavy" coat of chromium.

What is a "heavy" coat of nickel?

What is a "heavy" coat of chromium?

And there lies the most important reason for the spread of estimates. A "heavy" coat of nickel on brass may be anywhere from 0.0003 in. to 0.001 in. or over. To be sure, there are a variety of specifications for nickel and chromium on brass and steel parts, giving various thicknesses—*but they do give thicknesses*. The word "heavy" means almost anything—or nothing.

Also, why call for "buffing smooth before each plating?" There are now available many bright nickel plating solutions, which, if not alone, then certainly with a light fanning operation after the chromium, give a finish fully equal to the buffed copper, buffed nickel and polished chromium.

Now to the next sentence, requiring a guarantee of two years against stripping, and withstanding exposure to sea and shore atmosphere. Guarantee of electroplating in the consumers' hands is very risky procedure. Many of these parts are exposed to storms and sharp changes of weather. Many are in wash rooms and lavatories. Many of them are constantly handled by millions of people. The fixtures are in the care of unskilled labor and their cleaning and polishing may be neglected. Since the life of a plated part depends to a considerable extent upon the care with which it is handled, and the conditions of its abuse and use are completely beyond the control of the plater, a guarantee for two years or five years or even three months, lays the plater open to unforeseeable damages.

Add to this the fact that the rejection of defective work may even allow the commission to have it re-plated and billed to the original plater, and it becomes obvious why some bids were so high. It undoubtedly accounts for bids J and K of $777.85 and $887.14 respectively. These platers noted carefully the two-year guarantee and determined to do a job that would stand up under almost any imaginable conditions. The bid of plater L of $1,557.96 can be explained only on the ground that he was unfamiliar with this class of work, that he noted the two-year guarantee and decided to put in a figure that was bomb-proof.

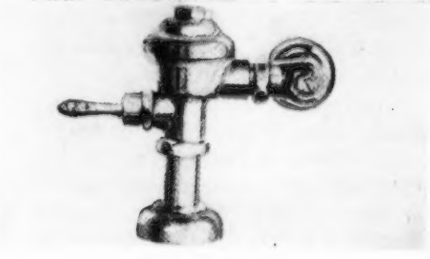
Bids A, B and C also require explanation. Bid A of $298.14, the writer learned privately, was made in virtual ignorance of the job. The estimator did not see the work; it was described to him by an associate, who brought back only a verbal report, omitting many essential details, and with complete disregard of the two-year clause. This plater figured on doing a job which would pass muster in the

LEFT

AUTOMATIC control fountain head or "bubbler." (Courtesy of Halsey W. Taylor Co.) What price re-plating—20¢ or $1.75?

RIGHT

FLUSHOMETER. What should be the price for re-plating this part—50¢ or $1.75? (Photo courtesy American Radiator & Standard Sanitary Corp.



cheaper class of apartment houses where no guarantees are asked for or given, and where, if the plating wears out quickly, the tenant either does not complain, or if he does, the parts are given another cheap plate.

Bids B and C of $380.44 and $414 were also made on the basis of cheap work, but with a better knowledge of the work involved. It is probable that these bids minimized the amount of grinding necessary to remove wrench marks and other scars.

When the bids were opened, naturally "A" got the job. After a study of the other bids he wisely turned it down. Obviously, if he had taken it, he would have "lost his shirt," either in bringing the job up to specification or in liability for having to do it over. Bidders B and C at $388.20 and $414 respectively would "get away with it" if they were lucky. But they, according to the writer's information, took this risk with their eyes open. Although this is not the best practice, in these piping times, it is very often done "to keep the shop busy."

This leaves the six platers D to I inclusive, who bid from $470.11 to $528.81. It is most enlightening that at least one of these bidders (F, at $496.35) had done work for the same commission in former years. In other words, he knew what he was about.

Any attempt to organize this clearly chaotic condition must take into consideration all of the following points:

(1) If a contract must go to the lowest bidder and if, as always happens, one or more bidders estimate blindly, foolishly, or take chances, it is certain that the successful bidder will lose money or that the work will be badly done.

(2) If specifications are loose, vague, and indefinite, the bids will vary from alpha to omega—even if the bidders are all careful, sound and experienced estimators (which never happens).

Perfection in placing and performing contracts is, of course, as impossible as perfection in any other field of endeavor. Mistakes may be made by even the best, let alone the next best, the tenth best and the worst, who are always bidding on some job or other. But the first, the most important and the most thoroughly practical and easily instituted preventive of trouble is *proper specifications*. Of these there is no longer any lack. There are available Federal specifications and recommendations of the National Bureau of Standards. Certainly, from one of these guides, sufficient information could have been extracted to have set proper standards for this job.

It is hoped that in the future, for jobs of this character, specifications will be set that will be a guide to the bidder and a protection to the purchaser in search of "a good plating job."

SHOWER heads and ball joints. Cost of re-plating —25¢ or 75c? (Photo courtesy of American Radiator & Standard Sanitary Corp.)

TABLE I

Competitive Bids for a Plating Job

A	$298.14
B	388.20
C	414.00
D	494.85
E	488.27
F	496.35
G	496.40
H	531.45
I	528.81
J	777.85
K	887.14
L	1557.96

TABLE II—Itemized Bids for the Same Plating Job

		Plater A		Plater E		Plater K	
	Item	Unit Price	Total	Unit Price	Total	Unit Price	Total
56	flanges	3¢	$1.68	8¢	$4.48	10¢	$5.60
216	flushometer valve and angle valve	50¢	108.00	93¢	200.88	$1.75	378.00
120	shower heads and ball joints	25¢	29.00	40¢	48.00	75¢	90.00
500	feet 1/2-in. brass pipe	7¢	35.00	8¢	40.00	10¢	50.00
350	feet 3/4-in. brass pipe	6¢	21.00	9½¢	33.25	12¢	42.00
164	wall flanges, 3/4-in.	4¢	6.56	6¢	9.84	10¢	16.40
4	extended body faucets	25¢	1.00	22¢	88¢	75¢	3.00
200	1½-in. brass bolts	1¢	2.00	1½¢	3.00	10¢	20.00
72	1/2-in. elbows	5¢	3.60	8¢	5.76	12¢	8.64
10	soap dispensers, pump type	* 10¢	1.00	30¢	3.00	75¢	7.50
8	combination faucets and angle valves	35¢	2.80	$1.32	10.54	$2.00	16.00
1	mixing valve and angle valve	$4.00	4.00	60¢	60¢	$2.00	2.00
2	1½-in. spray heads	50¢	1.00	25¢	50¢	50¢	1.00
64	pieces 9-in. tubing 1¼ in., and 64 bell escutcheons	15¢	9.60	17¢	$10.88	50¢	32.00
7	basin faucets, complete	15¢	1.05	35¢	2.45	50¢	3.50
5	electric plates	8¢	0.40	15¢	75¢	25¢	1.25
1	cabinet part	$2.00	2.00	20¢	20¢	$2.50	2.50
14	bottle fillers and goosenecks	50¢	7.00	88¢	12.32	$1.75	24.50
28	Halsey Taylor bubblers	20¢	5.60	44¢	12.32	$1.75	49.00
28	handles & bonnets	20¢	5.60	30¢	8.40	35¢	9.80
20	bubblers	10¢	2.00	22¢	4.40	$1.00	20.00
20	strainers	10¢	2.00	13¢	2.60	20¢	4.00
20	cross tee handles	15¢	3.00	20¢	4.00	15¢	3.00
20	bonnets—China bowl parts	10¢	2.00	35¢	7.00	75¢	15.00
20	handles cross tee	10¢	2.00	20¢	4.00	15¢	3.00
40	bonnets	10¢	4.00	20¢	8.00	20¢	8.00
40	flanges	5¢	2.00	10¢	8.00	12¢	4.80
4	flange hooks for rope	15¢	60¢	30¢	1.20	35¢	1.40
17	push plates, 3½x14 in.	25¢	4.25	21¢	3.54	75¢	12.75
8	kick plates, 8½x30 in.	$1.50	12.00	$1.46	8.48	$2.00	16.00
6	thumb bolts and flanges	10¢	60¢	10¢	60¢	15¢	90¢
8	handles for doors	15¢	1.20	55¢	4.40	25¢	2.00
96	hatch hole covers, 6-in. port holes	15¢	14.40	25¢	24.00	35¢	33.60
			$297.94		$488.27		$887.14

Fundamentals of G

By BOYD H. WORK
Carborundum Co.

MOST grinding troubles—whether low production, excessive wheel wear, poor finish, or what-not — can usually be traced back either to using the wrong wheel for the job, or using the right wheel in the wrong way.

Exhaustive tables are available which show recommended wheels for practically all grinding jobs that come up in metal working shops. They can generally be relied upon to show quite closely which of the thousands of available combinations of abrasive, grain size, type of bond, grade and structure will come close to doing a given job to best advantage. However, the final selection of the exact wheel to use usually depends upon actual test on the job, for there are intangible conditions such as condition of the grinding machine and skill of the operator which cannot be foreseen by the compilers of wheel selection tables.

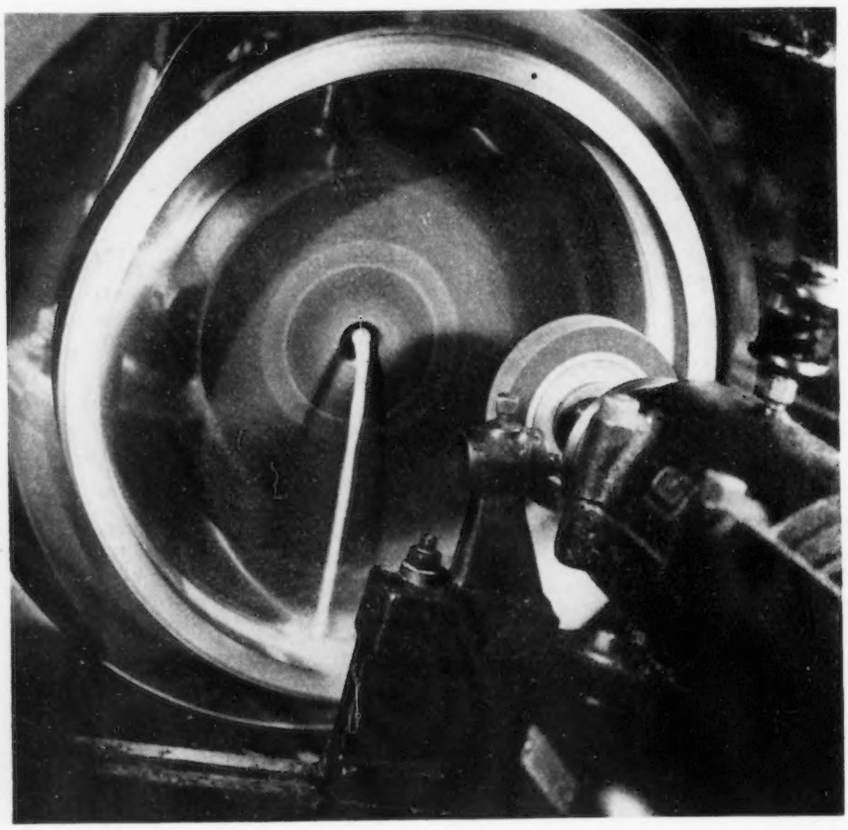
An understanding of the action of a grinding wheel is of great help in selecting the right wheel, and in using it to the best advantage. Much misunderstanding of wheel action has been caused by comparing it to that of a milling cutter on the one hand, or to a strictly abrading action similar to that of a sandstone. Neither is strictly correct.

A closer approximation to the facts is to say that the grinding wheel differs from other metal removing tools in that it is self-sharpening. Even that is not an exact statement. While it is true that the wheel can be relied upon to sharpen itself on operations where a large amount of stock is removed and close accuracy is not needed, when accuracy is necessary the wheel must be sharpened with a dressing tool.

What is meant by self-sharpening is this: Under perfect use, the abrasive grains will break and present new cutting edges to the work before the grains get too dull to cut effectively, and when the useful life of the grains is over, they will be torn from the bond so that a new grain can come in contact with the work.

It is evident that these results depend largely upon the stresses set up in the wheel. To give satisfactory grinding performance the stresses should be at or close to the resistance point of both the grain and the bond. Under that condition a slight increase in the stress will break the grain or tear it from the bond, while a similar slight decrease in the stress will allow the grain to dull without breaking and the wheel to glaze due to the grains being retained too long by the bond. In the first case the wheel is said to act "soft;" in the latter, to act "hard." The one results in excessive wheel wear, the other in sacrifice of cutting action. Either raises grinding costs.

The stresses in a wheel's cutting face, due to contact between the wheel



IN internal grinding the arc of contact usually will be greater than for cylindrical grinding, thereby subjecting the grains to less compressive stress. This factor is one that governs the selection of grade of bond, a softer grade being called for when the stresses are lower.

Grinding Wheel Selection

and the work, are chiefly impact, compression and shear. It is these stresses that tend to break the grain or tear it from the wheel. The stresses depend upon:

(1) The physical properties of the material being ground

(2) The area of contact between work and wheel

(3) The ratio between wheel speed and work speed

(4) The rate of traverse or cross speed

(5) The rate of in-feed.

It is evident that a hard material such as cast white iron or chilled iron resists penetration by the abrasive grain and so subjects the grain to greater compression stresses than a softer material.

The area of contact between wheel and work affects chiefly the compression stresses. If the wheel and work are brought into contact with a certain total pressure, it is evident that the pressure per unit of area, which for a wheel of given grain size amounts in the end to the pressure borne by each grain, increases as the area of contact decreases, and vice versa.

The area of contact in cylindrical and internal grinding is the product of the width of contact by the arc of contact measured along the circumference of the wheel face. So long as the wheel does not run off the work, the width of contact is constant.

In cylindrical grinding the arc of contact depends upon the sizes of the wheel and of the work and upon the in-feed. If both the wheel and the work are large in diameter the arc of contact will be large. Reducing the diameter of either, reduces the arc of contact. For given sizes of wheel and work, the greater the in-feed the greater the arc of contact.

In internal grinding, for a wheel and work of given diameter, the arc of contact will be greater than for cylindrical grinding. Also, the arc and area of contact will have much more effect on the wheel action than in cylindrical grinding. As in cylindrical grinding, the arc of contact decreases as the size of the wheel decreases. But since the most economical performance is secured when the largest possible wheels are used, large arcs of contact

HEREIN, in the first section of this two-part article, Mr. Work analyzes the cutting action of grinding wheels and indicates how a given wheel may be made to act soft or hard by modifying some of the work-wheel factors. The second part, which will appear next week, describes the general principles governing the choice of abrasive, grain size, structure, bond and grade for any given type of work.

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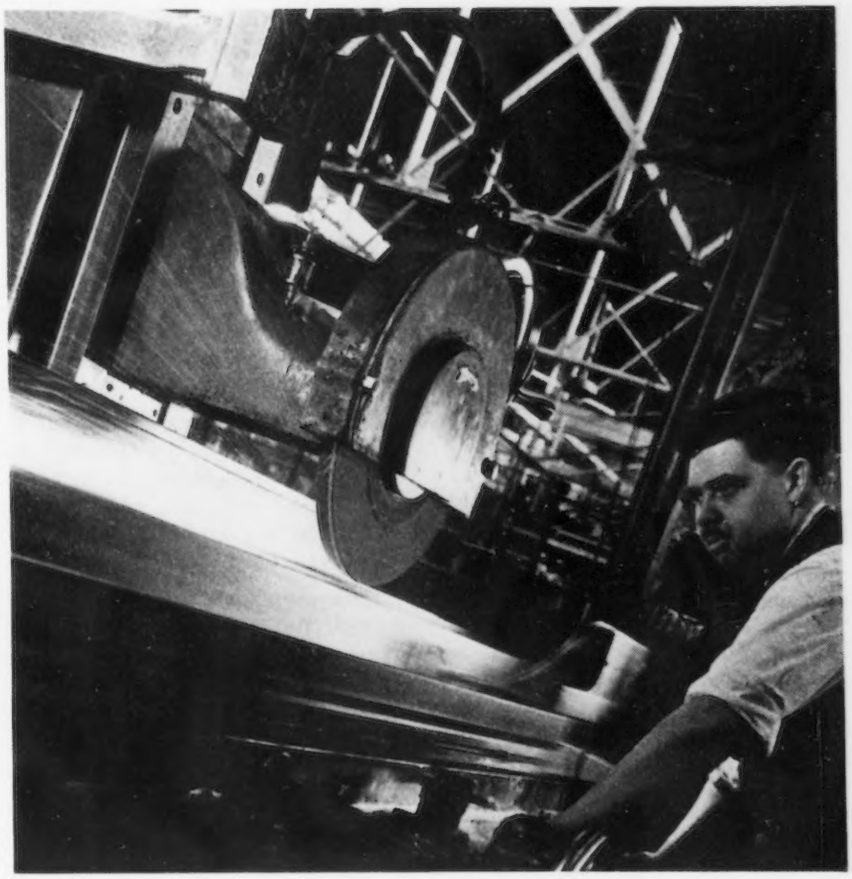
WHEN surface grinding with the periphery of the wheel, the same factors apply as in cylindrical grinding as far as wheel action is concerned.



compared to wheel diameter are the rule. Thus the overall effect is greater even though the actual length of the arc may be less than in cylindrical grinding.

In internal grinding, wheel action can be affected more by varying the shearing forces of traverse than by varying the compression forces of work speed and in-feed.

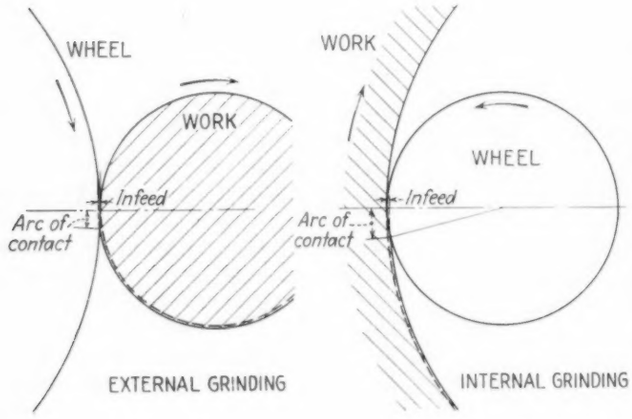
In surface grinding, when using the periphery of a straight wheel the area and arc of contact are measured as in cylindrical grinding, and the factors involved are the same. But when surface grinding is done with cup or cylinder wheels, two flat surfaces are in contact and the area depends upon the shape and size of the work presented to the wheel. Since these vary rapidly, the stresses set up fluctuate widely.

When using a straight wheel for cylindrical, internal or surface grinding the wheel is constantly being reduced in diameter by wear, with the result that the forces acting on the wheel face are increased. Unless compensated for, the stresses per unit of area will increase and a given wheel will act softer.

Variations in Wheel Action

One of the most effective ways to govern the action of a wheel is to adjust the relation between the work speed and the wheel speed. The effect of changes in the ratio of work speed to wheel speed is not hard to understand.

First, it should be remembered that the revolution of the wheel not only brings an abrasive grain into contact with the work, but also removes it from contact. Now assume a wheel operating at a constant peripheral speed. An abrasive grain is in contact with the work for a definite length of time. At a given work speed the grain will remove a chip of a certain size. Now speed up the work. From the time the grain makes contact until it leaves the work, a greater amount of metal will be presented to it. In consequence the chip will contain more metal, the grain will have done more work and the shearing stress will be greater. To some extent the compression stress will also increase. The wheel will break down more rapidly, through tearing out of the grains — which is to say that the wheel will act softer.



IN both cylindrical and internal grinding, with the same in-feed, for a wheel and work of given diameter, the area of contact will be greater in internal grinding than for cylindrical grinding.

Contrariwise, reducing the work speed will enable the abrasive grain to leave contact with the work without removing so large a chip. The stresses are thereby reduced and the wheel acts harder.

Obviously, the same effects will be achieved respectively by reducing the wheel speed or increasing it. It is the *ratio* of the work and wheel speeds that affects the stresses and therefore the wheel action.

Here again wheel wear must be considered, for as the diameter of the wheel decreases the peripheral speed decreases, and the wheel will act softer, unless the r.p.m. is increased.

Effect of Traverse Rate

The rate of traverse affects the performance of a wheel. It sets up lateral shear stresses and also to some extent affects the compression stresses. The slower the traverse, the less will be both of these stresses. However, traverse rate has far less effect on the action of a wheel than any of the factors so far discussed. The rate is more important in its effect on finish. Other things being equal, slower traverse makes for better finish.

It is obvious that the greater the rate of in-feed, the larger will be the chip removed by each grain. As with increase of work speed relative to wheel speed, the gain in chip size increases the shearing stresses and so makes the wheel act softer. Also, increasing the in-feed increases the pressure between wheel and work and so increases the compression stresses.

Since increased in-feed increases the rate of material removal, there is a strong tendency to do so even to the point where there is excessive wheel wear and too frequent truing. Sometimes, as in plunge cut grinding where the wheel does not traverse, by reducing the work speed, high in-feeds can be used with consequent high production, and wheel wear kept within reason. This is due to the fact that lower work speed reduces the stresses on the wheel face, making the wheel appear to act harder.

To sum up: wheels act softer when the impact, shearing or compression stresses—separately or in combination —are increased by the following conditions:

(1) Hard or tough, high tensile strength materials

(2) Reducing the area of contact

(3) Increasing the ratio between the work speed and the wheel speed

(4) Increasing the rate of traverse

(5) Increasing the in-feed.

In the next article will be discussed the characteristics of various abrasives and bonds and the author will show how the fundamentals discussed in this article determine the choice of wheels for any class of grinding operations.

(*To be concluded next week*)

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Electroplaters Meet

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Concluding last week's report of the Dayton convention of the American Electroplaters' Society. Reports deal with adhesion of electrodeposits, plating of die castings, silver plating, etc.

B. F. LEWIS of the Northwest Chemical Co., Detroit, spoke on the "Relationship of Cleaning Techniques and Adhesion of Electrodeposits." A few general rules for anodic cleaning on steel were given.

(1) Maintain a high ratio of alkali to radicals such as phosphate, silicate or resinate.

(2) Operate the bath at temperatures high enough to promote mobility of the solution and rapid replacement of alkali at the anodic work surface.

(3) Avoid excessive current density, especially when conditions (1) and (2) are not under control.

It is entirely practicable to utilize anodic films, produced by reverse current cleaning (see accompanying illustration), to promote good adhesion of electroplates on non-ferrous metals. In the case of brass, it is highly desirable to deposit nickel electroplates on a surface which is slightly etched. When cathodic cleaning is used, this etch can be obtained only by the use of a relatively strong acid dip. This acid treatment usually results in considerable loss of luster on the surface, and the nickel deposit will be adversely affected. When anodic cleaning is used a type of intra-crystalline etch is produced in the anodic treatment itself, so that a very dilute acid neutralizing dip may be used.

The problem of obtaining satisfactory adhesion of copper-nickel electrodeposits on zinc alloy castings has been most serious. Several factors serve to complicate the cleaning and plating of this metal. First, the high chemical activity of the basis metal places rather narrow limits on the materials which may be used in cleaning; second, the fact that die cast surfaces which have been buffed react with cleaning and acid solutions more rapidly than unbuffed surfaces, introduces a complication; third, aging of the plated casting, whether over a long period or accelerated by baking in enameling operations, induces physical and chemical changes at the point where the electrodeposit joins the basis metal. All of these factors directly affect the adhesion of the electroplate, and all are closely associated with cleaning procedure.

Diffusion of copper on die castings proceeds rapidly at 250 deg. F. in cases where the casting has been exposed to hydrogen, either in cleaning or plating operations.

Diffusion is slower in cases where the casting is exposed to a minimum of hydrogen evolution in cleaning, and the copper is deposited at high efficiency.

In any case, diffusion will proceed to completion at temperatures above 300 deg. F., unless rupture or blistering occurs to halt the process of diffusion.

Diffusion in itself is not a primary cause of poor adhesion. Poor adhesion is generally associated with diffusion layers which have been subjected to embrittlement by residual hydrogen in the casting or in the copper deposit. Cleaning procedures which reduce to a minimum the discharge of hydrogen on the die cast surface contribute to good adhesion of the deposit.

Preparatory treatments which induce the electrodeposit to follow the same crystal orientation as the basis metal contribute to good adhesion.

Plating Die Castings

F. F. Oplinger of the Electroplating Division of the E. I. duPont de Nemours & Co., Niagara Falls, N. Y., described at length problems involved in the "Plating and Heating of Zinc Base Die Castings." The plating of zinc base die castings has been a more or less constant source of trouble to the electroplating industry ever since die cast metal came into common usage. The main source of trouble has been the formation of blisters either during the plating operation, in a short period of time after plating, or after short periods of actual service.

The blistering problem became greatly intensified following the introduction of colored lacquers, etc., now commonly used for decorative purposes on plated castings. The higher the temperature required for baking the castings, the greater is the tendency toward blistering and peeling.

Following polishing and buffing, the castings should, whenever possible, be plated immediately to prevent the formation of objectionable films on the polished surface due to air oxidation and contact with alkaline or acid fumes. Castings, which have been allowed to age for long periods of time after polishing and buffing, should be rebuffed prior to plating.

The precleaning or removal of buffing compound is an extremely important step. Solvent degreasing is generally used. Means for degreasing with aqueous solutions are also being used. For the best results the precleaning operation must be carried out in such a way that all grease, buffing compound, or dirt is removed without discoloration or change in appearance of the surface of the casting.

For cathodic cleaning following solvent degreasing the best results have

been obtained using the following mild alkaline solution:

Trisodium phosphate	0.5 to 1.0 oz. per gal.
Soda ash	1.0 to 2.0 oz.
Temperature	160 deg.-180 deg. F.
E.m.f.	6 volts
Time	30 sec. to 2 min.

Regardless of just what composition or type of cleaner is used, or whether anodic or cathodic, the best results on baking can be obtained only when the appearance and surface of the casting after cleaning, are virtually unchanged. This represents the so-called "mild cleaning" whereby "overcleaning" is avoided.

Only very dilute acid pickles are recommended. The best results have been obtained with muriatic acid, 0.5 to 1 per cent by volume. Sulphuric acid, 0.5 per cent by volume or stronger, does not appear to be quite as satisfactory.

Unbuffed areas require a more severe etch than polished areas: hence the necessity for having an acid dip which is sufficiently strong to affect the unbuffed areas but not too strong to damage the buffed area.

The author discussed at some length the diffusion rates of copper into zinc base die castings under atmospheric conditions and drew the following conclusions.

Coatings of copper and nickel when properly applied cannot be separated from the base metal with a sharp instrument when such coatings are not baked. When baked at normal paint drying temperatures for short periods of time, approximately 1 hr. or possibly more, the same fact holds. When baked for long periods of time at 300 deg. F. so that a substantial diffusion layer 0.0001 in. or more is formed, the diffusion layer may be parted evenly over the entire casting. This can be done even when no blistering has taken place.

When a casting is properly cleaned, it can be heated for a period of time (in excess of 100 hr.) at 300 deg. to 350 deg. F. until virtually all of the copper has alloyed with the base metal without blistering.

With proper cleaning no diffusion takes place in 60 hr., at a temperature of 250 deg. F. With a temperature of 325 deg. F., slight diffusion takes place after 2 hr. Complete diffusion of heavy coatings of copper, 0.0005 in., takes place in 100 to 150 hr.

When strong alkaline cleaners, for example (2 oz. per gal. trisodium phosphate and 2 oz. per gal. NaOH) are used together with strong acid—HCl (5 per cent)—diffusion sets in rapidly at 325 deg. F. Violent blistering takes place and the diffusion layer will have reached a depth as much as 0.00025 in. in as little as 1 hr.

In general, mild acid treatment should follow mild alkaline treatment. If strong alkaline cleaning is required, because of poor degreasing, rather severe etching is required. If mild acid treatment follows strong alkaline treatment or vice versa, trouble is to be expected due to blistering.

Where it becomes necessary to heat plated coatings on die castings for any reason, up to 250 deg. to 350 deg. F., the following procedure is recommended:

(1) Polish and buff as may be required.

(2) Degrease thoroughly using a three-phase machine.

Note: Discoloration of the casting, formation of spots, smut or incomplete removal of buffing compound must be avoided.

Treat cathodically in the following:

Soda ash	1 to 2 oz. per gal.
T.s.p.	0.5 to 1 oz. per gal.
E.m.f.	6 volts
Temperature	160 deg. to 180 deg. F.
Time	30 sec. to 90 sec.

Water rinse.
Acid pickle
0.5 to 1.0 per cent HCl by volume.
Temperature—room.
Time—30 sec. to 90 sec.
Water rinse.
Copper strike.
Copper plating.

Mild cleaning as shown produces deposits which do not diffuse readily or blister, and after long heating at high temperature, they diffuse uniformly so that the diffusion layer can be parted in sheets or uniform layers. Diffusion layers are sufficiently adherent to permit polishing for making microphotographs.

When "overcleaned," diffusion and blistering rates are greatly increased and on long heating the diffusion layer separates very readily. The importance of using so-called "mild cleaning" is shown quite definitely.

Pickling of Metals

A very practical paper on the "Pickling of Metals for Electroplating" was read by O. T. Towner, Autosun Products Co., Cincinnati. The author described the latest developments in equipment for pickling, such as acid-proof tanks, rubber-lined pipes, valves and fittings, racks and baskets made of acid-resistant metals.

He stressed the importance of temperature control. On first consideration, it might seem that a high temperature would appear to save both time and acid, but in reality it will be found that there are definite limiting factors regarding temperature which must be observed. In addition to the acid loss that is due to high temperature, there will also be the evolution of toxic fumes, which are not only objectionable to the workmen but are very destructive to the building and equipment. Low temperature and higher acidity to maintain the desired cycle are accepted by the trade as being the most economical.

One of the problems in pickling occurs in handling high carbon or spring steel which is imperiled by hydrogen absorption. A very interesting method was described for handling this type of material, to be later plated with cadmium. Washers, springs, etc., are tumbled in a steel barrel with sand and a small amount of alkaline cleaner for about 2 to 3 hr. The pieces are then removed from the barrel, rinsed and placed directly in the plating solution.

The author described the action of sulphuric, muriatic, nitric and hydrofluoric acid pickles, giving the formulas suitable for various base metals.

Moving Cathodes

W. M. Phillips of General Motors Corp., Detroit, spoke on the "Effect of Moving Cathodes." He described some work begun (but not yet carried to its conclusion) with cathode speeds up to 50 ft. per min. in a copper sulphate bath. One of the interesting facts noted was that the concentration of acid made no difference in the deposit but that the rate of motion of the cathode was extremely important, increased temperature and increased speed both being effective in improving the deposit. In general, it was observed that the highest concentration of acid and the highest speed gave the best conditions for the use of high current densities which are sought because of the increased speed of plating which they effect.

The discussion brought out the fact that the trend in agitation is toward moving cathodes rather than air agitation of the solution. The objections to air are the bubbles which interfere with the current distribution, stirring up dirt in the tank, causing roughness in the deposit, and also the presence of oil from the air lines which contaminates the bath.

"Silver Plating at Very High Current Densities" was described by A. C.

Simon and J. T. Lumley of the American Silver Producers' Research Project at the Bureau of Standards, Washington. In seeking new industrial uses for silver, the research staff of the American Silver Producers' Research Project has studied the utilization of silver as a protective lining for industrial containers. It was decided to experiment initially with cans having a copper coating of 0.001 in. (0.025 mm.) followed by 0.0001 in. (0.0025 mm.) of silver, which coatings were found to be pore-free by both laboratory and packaging tests.

This paper presents the results of some exploratory investigations of silver plating on can shells at high current densities. The following factors appear to govern the plating of cylindrical steel bodies.

The permissible current density to produce smooth adherent deposits may be increased by:

(a) Increasing the silver content of the bath.

(b) Increasing the content of free cyanide.

(c) Increasing the temperature.

(d) Increasing the agitation.

Under favorable conditions, with good agitation, current densities of at least 200 amp. per sq. ft. (21.5 amp. per sq. dm.) may be used, at which over 0.003 in. (0.0076 mm.) thickness of silver may be deposited in one minute.

The cell voltage in these tests ranged from 4.5 to 7.5 volts. The current density produced by a given voltage was slightly decreased by raising the silver content and was increased by raising the free cyanide or by raising the temperature. The principal cause of these effects was the change in conductivity of the solution.

Cathode polarization apparently had only a small effect on the current density. If silver anodes were used, with necessarily a smaller area and a higher current density than on the cathodes, a black film formed on the anodes and the polarization was very high. In the experiments reported, steel anodes of the same size as the silver anodes were therefore used.

An increase in free cyanide generally decreased the porosity. The porosity of silver applied over pore-free copper coatings is much less than when applied directly to steel or over a copper strike.

The cathode efficiencies under favorable conditions are 60 to 70 per cent.

A paper by Prof. D. T. Ewing and George W. Jernstedt of the Michigan State College, described in detail the "Cathodic Treatment of Copper in a Solution of Beryllium Sulphate to Prevent Tarnishing."

Work on the protection of metals by electrolysis in solutions of beryllium sulphate was first reported by Thomas and Price in 1938.[4] The results of their work showed that a certain degree of protection could be secured from films cathodically deposited from such solutions. They employed a simple bath consisting of beryllium sulphate and sufficient ammonium hydroxide to adjust the pH to the required value. Upon attempting to duplicate their work it was found very difficult to secure a coating without a coloration which was due to the interference patterns of the film. Furthermore, a blushing of the copper surface beneath was noted.

The present investigation was undertaken to determine more definitely the optimum pH of the solution, the effect of a buffer, heat treatment of the electro-deposited film, and the thickness of film necessary to prevent tarnishing, etc. The following conclusions were reached:

Copper may be treated cathodically in a solution of beryllium sulphate and ammonium hydroxide to give it excellent protection against oxidation in air at elevated temperatures or tarnishing from sulphur fumes.

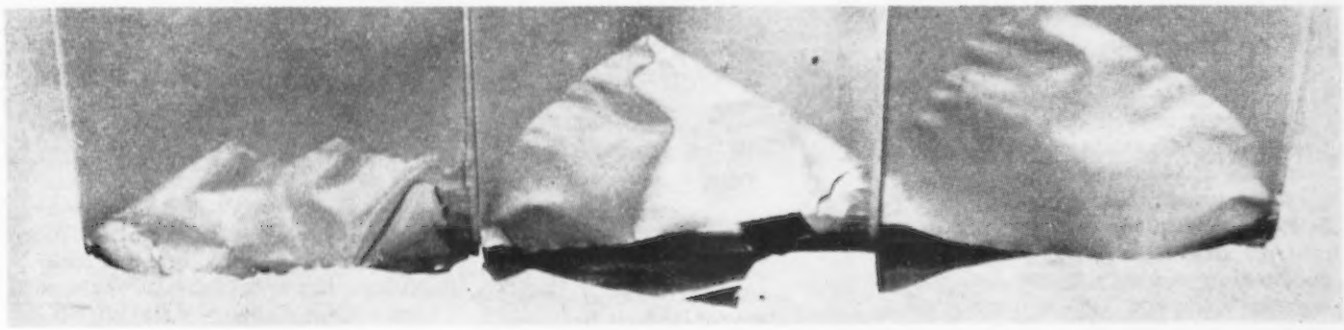
Deposition is made from a bath containing 3 to 4 gm. per liter of beryllium sulphate nearly neutralized with ammonium hydroxide. The film is probably composed of colloidal beryllium hydroxide which has a positive charge in solution and migrates toward the cathode when a potential is applied.

The addition of 3 to 5 gm. per liter of boric acid to the bath causes coagulation of the larger colloidal particles. This leaves the smaller particles to be plated out, which aids in forming a transparent and colorless film.

General operating conditions include: anodes of 7 per cent tin and 95 per cent lead; a current density range of 50 to 100 amp. per sq. ft. for a period of 4 to 6 min.; the pH of the solution is initially adjusted to between 5.5 and 5.9 and may be operated as low as 4.9. Dry film carefully and heat for a few minutes at 275 to 300 deg. F.

The film is limited to a thickness of approximately 0.000004 in., this being attained after the maximum potential has been reached during electrolytic treatment. The film, although limited to this small value, will withstand rubbing with non-abrasives, the main weakness being its low resistance to mechanical abrasion.

The peak voltage is an indication of the protective power of the film only for a given current density and bath composition. Otherwise the two factors are not related.



Cathodic cleaning—direct nickel plate—on steel panels. Note extreme sensitivity of nickel to cathodic polarization. Cleaners A, B and C, left to right respectively.

[4] G. J. Thomas and L. E. Price, J. Inst. Metals, 63, 21 (1938); 63, 29 (1938); 65, advance copy (1939).

Metallurgical Problems

WITH registration in the neighborhood of 1200, the 43rd annual meeting of the American Society for Testing Materials last week at Atlantic City was one of the most successful in the organization's history. An outstanding feature was a symposium on spectrochemical analysis, which accounted for two sessions on Thursday morning and afternoon. T. A. Wright, technical director and secretary, Lucius Pitkin, Inc., acted for Committee E-2 on Spectrographic Analysis in developing this interesting feature which was divided into two parts: the first, accuracy requirements versus reproducibility possibilities; second, presentation and interpretation of results. Various prominent engineers opened each session following which there was an active open discussion period.

All day Monday, June 24, was reserved for a succession of committee meetings. The first formal session on Tuesday morning included certain administrative committee reports, report of the executive committee, address by retiring president H. H. Morgan, award of honorary memberships, presentation of certificates to 40-year members, and the introduction of new officers. W. M. Barr, chief chemical and metallurgical engineer, Union Pacific Railroad, moved up to the presidency of the A.S.T.M. for the coming year; and H. J. Ball, professor of textile engineering, Lowell Textile Institute, moved up from the executive committee to the vice-presidency.

One of the features of the meeting was an address at the opening session by Lt.-Col. William C. Young, planning branch, Office of the Assistant Secretary of War, on the subject: "Material Standards in Industrial Preparedness." Colonel Young outlined some of the essential features of industrial preparedness, which involves planning for the procurement of supplies and equipment in the event of emergency. The importance of materials and commodity standards in such an event is well recognized, and Colonel Young discussed in particular this phase and the relationship thereto of the work of the A.S.T.M.

Colonel Young stated, "The question of material standards is a most important element in national preparedness for reducing the time factor in reaching quantity production of military equipment and supplies. Without these standards, there would be much delay, not only in production of semi-fabricated materials but also in processing them through the various stages of manufacture to the finished article.

"A comparison of the time necessary to reach full production with that required for training of combat forces, emphasizes the importance of early quantity production in a national emergency.

"The records of 1917 and 1918 show that the supply of critical articles of military equipment, guns, ammunition, tanks, gas masks, and aircraft, lagged far behind the training of man power. Of two million men in the theater of military operations at that time, the average time of training was nine months, six at home, two in rear areas in France, and one in a quiet sector. Initially, essential items of equipment, such as rifles and mobile artillery, were available for one-half a million men. Equipment from new production could not be had in time to equip our men, and we were dependent on our Allies to complete it. Supplies of our own manufacture did not come through in quantity until the early spring of 1919, two years after the declaration of war, compared to the nine months' average training of men in the combat forces.

"Modern war is no longer a conflict of armed forces alone. No one escapes its direct or indirect hardships. It is almost axiomatic that victory goes to the belligerent first able to throw into the struggle and maintain the whole organized man power backed by its full economic power converted to war purposes.

"Huge reserves of military equipment are costly to obtain, and costly to maintain. A small reserve of material, backed by the reserve in productive capacity of industry, is the most economical plan. In that case, the reserve on hand would need only to be large enough to meet requirements until supply could be had from new production."

There were two interesting sessions on non-ferrous metals, both on Friday.

Four papers were presented on anodic coatings. F. Keller, of the Aluminum Co. of America, reported on "Anodic Coatings Seen Through the Microscope." It was considered that microscopic examination of anodically coated aluminum alloys by the methods that were described provides a useful means for determining the characteristics of oxide coatings in general and the variations in the appearance of different alloys treated by the various oxidation treatments. The illustrations given served to show the relationship between the microstructural features of aluminum alloys and the characteristics of the oxide coatings produced by anodic oxidation treatments.

Junius D. Edwards, of the Aluminum Co. of America, reported on "Thickness of Anodic Coatings of Aluminum." It was pointed out that the thickness of an oxide coating is a characteristic which may help determine its usefulness for a variety of purposes. The measurement of coating thickness therefore becomes a matter of commercial importance. The paper presented some of the methods which may be employed for measuring the thickness of an oxide coating, and gave information regarding the accuracy and field of application of these methods.

Some of the methods described in the paper for determining the thickness of oxide coatings on aluminum give precise values and are best adapted for laboratory utilization; others give approximate values and are satisfactory for the control of plant production. The author pointed out that even simpler tests are available which may yield considerable information in the hands of an experienced person. A knife or scribe, for example, will usually disclose both by the depth of scratch and the sound, as it cuts through the oxide, whether the coating is thick or thin, and tell something about its hardness. In the case of very thin coatings, an ink eraser, or even a pencil eraser, may cut through the oxide in a relatively few strokes

Debated by A.S.T.M.

and give reliable qualitative information.

H. G. Arlt, of the Bell Telephone Laboratories, reported on "Abrasion Resistance of Anodically Oxidized Coatings on Aluminum." The development of an accurate air-blast abrasion testing apparatus and technique was described. This test is suitable for the determination of the abrasion resistance of oxide coatings on aluminum and of other organic and inorganic coatings.

The test equipment consists of a calibrated glass nozzle in which the abrasive is mixed with compressed air and which is housed in a suitable container arranged for the easy insertion and observation of the specimens under test. Information is provided as to the necessary control apparatus to insure a uniform supply of low pressure air at closely controlled pressure and rate of flow. Data are included on several sets of anodically oxidized coatings on aluminum to show the degree of duplicability of results both in a single laboratory and in several cooperating laboratories. Additional abrasion resistance data on anodically oxidized coatings on aluminum are included and are related to the thickness, oxidizing time and sealing conditions in order to illustrate the value of abrasion resistance information on coatings of this character. Abrasion data are useful not only in the development of oxidized coatings but also in directly determining the useful life of such finishes under abrasive environmental conditions.

K. G. Compton and A. Mendizza, of the Bell Telephone Laboratories, reported on the "Electrical Breakdown of Anodically Oxidized Aluminum: A Means of Checking Thickness of Anodized Finishes." It was pointed out that the existing methods for determining the thickness of anodically produced oxide coatings on aluminum are relatively few and are almost entirely of a destructive nature. It is a fairly well established fact that, within the thickness limits normally encountered in practice, the voltage breakdown is a linear function of thickness of oxide film. The authors have endeavored to utilize this fact in developing a test method for determining the thickness of coatings produced under known and controlled conditions with practically no injury to the finish. Data are given which show the relationship between breakdown resistance, anodizing time, thickness of coating, current density and sealing of anodically oxidized polished commercially pure aluminum. Statistical data for the values obtained are also given, indicating the good reproducibility of the breakdown values. By calibrating a particular anodic process, satisfactory results may be obtained in a relatively short time and often without destroying or marring the article. Since the oxide coating is not entirely homogeneous it is necessary to obtain a fairly large number of readings for every test condition. The authors have found that approximately twenty-five readings are usually sufficient and can be made in a relatively short time. Although only one of the many anodizing possibilities has been investigated, the applicability of this method of evaluating the thickness of oxide coatings may be extended to all commercial treatments.

W. M. BARR, newly elected president of the American Society for Testing Materials.

Following the papers on anodic coatings, Cyril Stanley Smith, of American Brass Co., reported on "Proportional Limit Tests on Copper Alloys." It was stated that since ordinary methods of obtaining axial loading in tension have been found unsuitable for precise tests, a new form of gripping device for 0.5-in. diameter threaded end specimens has been developed. The specimen is locked into a head containing the ball through which the load is applied and which is optically adjusted to be exactly on the axis of the specimen. The specimen is maintained at 32 ±0.1 deg. C. A high grade commercial testing machine is used and calibration corrections applied by which the loads are proportional if not accurate to 0.1 per cent. Machine error exceeds extensometer error at about 35,000 lb. per sq. in. Two Tuckerman extensometers reading to 0.000002-in. on a 2-in. gage length or an averaging one of similar sensitivity give strain readings which permit deviation from proportionality to be plotted, from which the stresses corresponding to an offset of as little as 0.0002 per cent can be confidently read.

Annealed 70-30 brass rod of small grain size (0.008 mm.) had a "proportional limit" corresponding to 0.0002 per cent deviation from proportionality of 23,000 lb. per sq. in. Stressing this to produce a permanent set of only 0.006 per cent dropped the proportional limit to 14,500 lb. per sq. in. and further stressing up to 35 per cent permanent elongation left the proportional limit at 8000 to 10,000 lb. per sq. in. By annealing at 300 deg. C. after stretching 10 per cent the proportional limit could be raised to 29,000 lb. per sq. in., but the gain was entirely lost on small overstrain. The engineering significance of these tests is not yet evident.

Permanent set after small straining of annealed materials is approximately

equivalent to the offset from the initial modulus line. In cold-worked brass the offset is many times greater than the permanent set, according to the author.

Corrosion Study

In the session dealing with corrosion, on Wednesday, an interesting paper was presented by N. B. Pilling and W. A. Wesley, of the International Nickel Co., on "Atmospheric Durability of Steels Containing Nickel and Copper." The results of six series of atmospheric corrosion tests were presented which evaluated the durability of sheet specimens of low alloy steels containing nickel and copper. Rural, urban, industrial and marine atmospheres were represented at the test sites. The commercial significance of the data is broadened by the multiplicity of compositions tested. The oldest series of exposures is now in its 15th year. Another series consists of large specimens simulating some of the conditions to which roofing sheets are exposed in service. The effects of composition variables were studied in one series and the corrosion-time relationship in another. The results of a practical railroad coal car test were also made available.

A general conclusion from this work is that the beneficial effects of nickel upon the weathering resistance of steel increase with increasing nickel content and are enhanced by the addition of optimum amounts of copper. The superiority of nickel copper steels over copper steels is particularly pronounced in a marine atmosphere to which the latter do not respond well. The effects of manganese, silicon and carbon contents do not appear to be important but the presence of a moderate amount of phosphorus seems to be beneficial in nickel copper steels.

Studies on Cast Iron

Following the session on corrosion, a number of interesting papers were presented dealing with various metallurgical aspects of cast iron.

Jasper O. Draffin, W. Leighton Collins, and Carl H. Casberg, all of the University of Illinois, reported on the "Mechanical Properties of Gray Cast Iron." Tests on nine hollow cylinders of gray cast iron having various ratios of wall thickness to outside radius were reported. Two sizes of cylinders were used, outside diameters of 3½ in. and 4½ in., with ratios of wall thickness to outside radius (t/r) ranging from 0.443 to 0.057. Tensile specimens were cut from various parts of the cylinder wall in a number of unmachined castings in order to furnish additional information on the mechanical properties and uniformity of the cast iron. Micrographs and chemical composition were included as well as typical twisting moment-angle of twist and tensile stress-strain curves.

Results obtained corroborate those found in earlier torsional tests of small solid and hollow cylinders. The ratio of the modulus of rupture in torsion to the ultimate tensile strength in direct tension (strength ratio) is independent of the external diameter of the cylinder. The modulus of rupture ranges, in a fairly regular curve, from 1.36 times the tensile strength for a solid cylinder to a value of 0.73 times the tensile strength for a hollow cylinder having a ratio of wall thickness to outside radius of 0.057. The curve, if extrapolated to zero (t/r), gives a value for the modulus of rupture equal to 63 per cent of the tensile strength.

The ratio of the maximum tensile deformation developed in torsion to the maximum tensile deformation developed in tension (strain ratio) decreases as the ratio of wall thickness to outside radius decreases until a (t/r) value of about 0.2 is reached after which there is no further definite change.

There was no evidence of any buckling failure in any of the thin cylinders.

C. H. Lorig, of Battelle Memorial Institute, reported on "Properties of Commercial Pearlitic Malleable Iron." The paper attempts to correlate mechanical properties of commercial, pearlitic malleable irons. Various data were secured from producers of pearlitic malleable iron and these along with data available in the literature are summarized in a table and in curves. Close relationships between tensile strength and Brinell hardness and between yield point and Brinell hardness appear to exist. In a broad sense these relationships are independent of the method of preparing the pearlitic malleable irons and are not affected greatly by the character of the combined carbon particles. Evidence indicated that the ductility of pearlitic malleable irons is affected by the microstructure more so than is the tensile strength and yield point. A short review is given by Mr. Lorig on the influence of those individual alloying elements often employed in commercial pearlitic malleable irons.

R. D. Landon, of Southern Methodist University, reported on "Stress-Strain Relations for Malleable Cast Iron in Tension with Special Attention to Yield Point Determination." The physical behavior of 141 tension specimens of malleable cast iron covering a wide range of carbon content was recorded and, based on the results, changes in the standard testing procedure are suggested for consideration. Results indicate that "yield point" stress might better be expressed as a percentage of the ultimate stress rather than as an arbitrarily fixed value. An elongation in 2 in. of 0.02 in. is recommended for the divider method of measuring deformation at "yield point" and a stress of 63 per cent of ultimate for minimum "yield point" stress is suggested. If an elongation in 2 in. of 0.01 in. is to be used, the suggested minimum "yield point" stress is 60 per cent of ultimate and a more accurate means of measurement should be employed. In order to be consistent with the A.S.T.M. definition of yield point, a new term, "proof stress," is suggested for the stress to be equalled or exceeded at a definite, measured elongation. Confirmation of negligible reduction in the strength of machined castings was mentioned by Mr. Landon.

Creep Investigation

One of the papers presented to the Thursday session on creep dealt with "Creep Strength of 17 Low-Alloy Steels at 1000 Deg. F.," the authors being R. F. Miller and W. G. Benz, of the U. S. Steel Corp. laboratories, and W. E. Unverzact, of the National Tube Co. The object of this investigation was to determine the effect of composition and heat treatment on the creep strength of the common low-alloy steels at 1000 deg. F.

The creep strength of the carbon-molybdenum steels increases with increasing molybdenum content both in the normalized and in the normalized-and-tempered condition. In each composition the creep strength of the normalized material is higher than that of the normalized and tempered material. At 1000 deg. F. the pearlitic structure resulting from the normalizing treatment is more unstable than the spheroidized structure resulting from normalizing and tempering.

The addition of chromium tends to lower the creep strength of carbon-molybdenum steel, but this decrease may be partially offset by increasing the molybdenum content. The stability of the carbon-molybdenum steels is increased by the addition of chromium, according to the authors.

Titanium or columbium improves the creep strength of chromium-molybdenum steels, but silicon and aluminum affect their creep strength adversely.

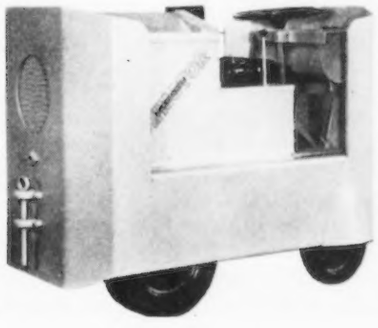
Conservative estimates of creep strength should be based on materials having a stable structure.

What's New In Material Handling Apparatus

By FRANK J. OLIVER
Associate Editor, The Iron Age

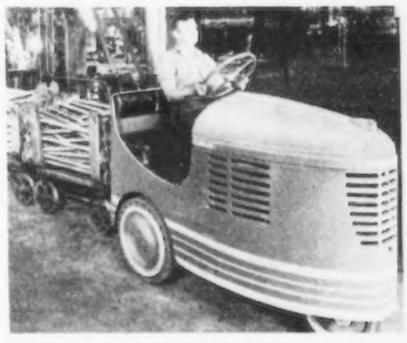
ANOTHER in the periodical series of related new equipment reviews, covering new designs of material handling devices placed on the market since the last report of this nature, published in the Feb. 8 issue.

ESPECIALLY designed for handling unwieldy loads of steel tubes or sheets is a new heavy duty industrial tractor with a special frame and bumpers, made by the *Towmotor Co.*, 1231 East 152nd Street, Cleveland. All contours are rounded to avoid catching obstructions, and special shields give driver and steering wheel more protection on sharp turns. Two ⅝-in. steel plate bumpers 48½ in. high by 42 in. wide form the integral end members of a rugged box type welded steel frame. The tractor, which has a width of 42 in. and overall length of 71½ in., has a drawbar pull of 4000 lb. and will pull 130 tons on level concrete. Its power plant develops 41 brake hp. and is built for 24-hr. duty. It is equipped with a three speed transmission and operates up to 8 miles per hr. This model CS tractor has an outside turning radius of 74 in. and can work in the closest quarters of rod, tube, wire mills, rolling mills, stamping plants and machine shops.



Streamlined Industrial Tractor

A NEW Clarkat industrial tractor, streamlined in appearance and steel turreted in a ½-in. shell to afford complete driver protection, is offered by the *Clark Tructractor Division* of *Clark Equipment Co.*, Battle Creek, Mich. Having an overall width of 38¼ in. and 57 in. turning radius,

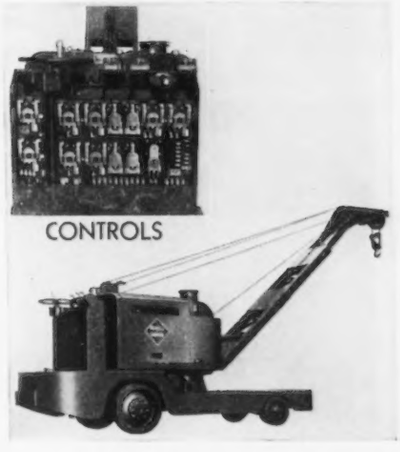


the machine is compact enough to thread crowded aisles easily, pass through narrow doorways and operate on congested platforms. The unit is powered by a Continental engine, capable of 24-hr. continuous operation. Speed is up to 8 miles per hr. Tractor will pull 25 tons on trailers. Equipment includes self-starter, hydraulic brakes and air cushion tires in rear, solid in front, universal coupler operated by driver from seat and a 4-gal. gasoline tank. Twin wheels at the front provide stability and assist the tractor in negotiating rough roadways.

Power Industrial Crane

THE new C-4 power industrial crane brought out by the *Elwell-Parker Electric Co.* of Cleveland, has a rated capacity of 3000 lb. at a 7-ft. radius and travel speed up to 5½ miles per hr., depending on voltage of battery. Standard telescoping boom, 12 to 19 ft., slews approximately 300 deg. in 20 sec. Hook speed, 30 to 50 ft. per min. Storage battery or gas-electric power is optional. Four motors individually drive the travel, hook hoist, boom hoist and slew. Motors are equipped with solenoid brakes.

Cranes are fitted with full magnetic contactor control equipment. Two foot pedals are interlocked with the drive controller, the right pedal closing the power circuit and the left releasing the brake. No fuses are used in the power circuit, thus permitting stopping and starting on inclines.



Lift Grab Stacking Feature

CONSTRUCTION of a removable upper jaw extending from the top of the mast in the Towmotor lift ruck pictured prevents bouncing and spillage of light weight goods while being transported for stacking. When the forks have entered the pallet under the pile of boxes, the hydraulic lifting mast is set in motion. The load is then raised until the upper jaw with spring tension grip contacts the top of the pile. This lift-grip feature is offered by the *Towmotor Co.* as an economical answer to the problem of handling a variety of bulk goods shipped in boxes, bales and crates. It permits taking much larger loads per trip, allows faster travel and does more accurate stacking because pallets can be loaded to the full height of the stack.

Diesel Yard Locomotive

CONFINED to a height of only 56 in. to permit passage under low clearances is the new model BMG Brookville locomotive, which is powered with a General Motors series 71-6 two-cycle diesel, developing 120 hp. Applied through a range of four speeds in both forward and reverse, this power makes possible speeds up to 15 miles per hr. and permits hauling heavy loads in high gear on grades. Weight is 10 ton, making a power ratio of 12 hp. per ton. Performance is enhanced by drive on all four wheels, steel tires for increased traction, dual journal spring suspension for negotiation of rough tracks, and Timken roller bearings on the wheel journals. This hauling unit is made by the *Brookville Locomotive Co.*, Brookville, Pa.

½-Ton Hand Lift Truck

HALF TON is the name given a general purpose lift truck added to the line of the *Barrett-Cravens Co.*, 3250 West 30th Street, Chicago. This new unit serves as a combination lift truck with a full 2-in. lift for big loads that are handled on skids and as a floor truck for bulkier single objects, tote boxes, small bins, etc. The Half Ton is equipped with four ball bearing wheels, the front being of the swivel type. U-type tubular steel handle lifts loaded skid when pulled down to an angle of about 45 deg. Truck platform is lowered by a light pull on trigger chain. Truck is of all welded steel construction and is light in weight.

Hand Lift Truck

THE Transliftor, a new hand lift truck manufactured by the Yale & Towne Mfg. Co., Philadelphia, is designed to handle heavier loads on skid platforms with less effort.

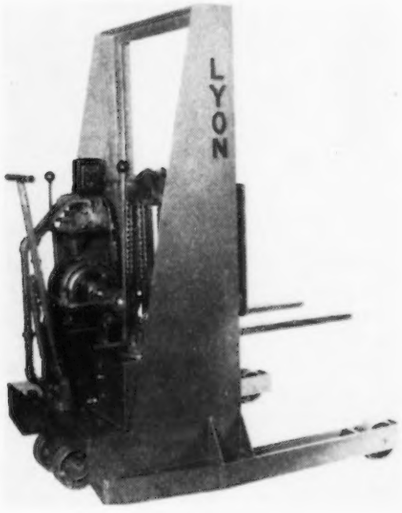
Providing a positive mechanical selective pump action lift, this lift truck features reduced effort for pump handle operation. For operator safety, the handle has a lower flush-welded grip with no projecting edges. Made in capacities from 3500 to 5000 lb., the Transliftor is available in either wide or narrow frame models. Both feature hydraulic release checks to prevent dropped loads and torsion type rear links for side sway elimination.

Drum Type Magnetic Separator

THE *Dings Magnetic Separator Co.*, Milwaukee, has announced the Type XM magnetic separator for separating magnetic particles from aluminum, brass and bronze borings and turnings. The unit is also used for conditioning foundry sand. It consists of a hopper and a power driven roll, which is highly intensified by a powerful coil. All magnetic particles are attracted and held fast to the surface of the roll until they pass out of the magnetic field. The non-magnetic materials pass over the roll and are discharged in a normal trajectory.

Hydraulic Elevating Truck

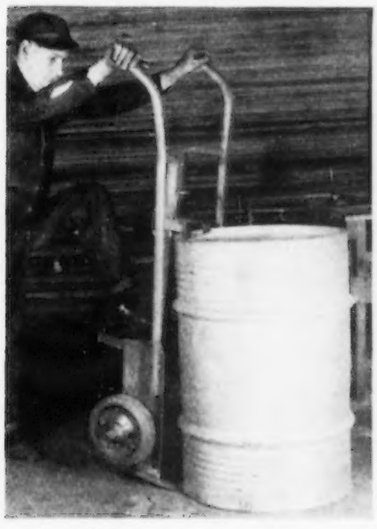
BECAUSE a customer wanted to use a hydraulic lift truck in sections where no current is available, the *Lyon Iron Works*, 522 Madison Street, Greene, N. Y., equipped the unit shown with a two-speed hand pump in addition to a regular motor-driven hydraulic pump. To elevate the forks by the hand pump it is only necessary to move the pump handle back and forward without opening any valve. The truck is used for handling pallets



of tin plate and is of 3000-lb. capacity. Forks are 27 in. long, 18 in. in overall width and have a lowered height of 2 in. and an elevated height of 48 in. The truck is of fifth wheel steer type, the four load wheels being 7 in. in diameter by 3 in. face, ball bearing equipped.

Barrel Truck

DRUMS weighing up to 1000 lb. can be handled by the average man with the barrel truck illustrated,



according to the maker, the *Palmer-Shile Co.*, 7100 W. Jefferson Avenue, Detroit. The truck is shoved up against the drum, barrel or keg, a hook is dropped over the rim and when the operator puts one foot on the lower cross member and pulls back on the handles, the load is picked up easily. When the wheels touch the floor, the load is in balance. Truck is of welded steel construction and weighs 85 lb.

Tri-Wheeled Rubber Tired Casters

TO offset the fact that rubber-tired wheels have much less capacity than steel wheels, but are often desired because of floor conditions, the *Service Caster & Truck Co.*, 511 N. Brownswood Avenue, Albion, Mich., has built a set of casters having three 12 x 4 in. rubber-tired wheels, pinned through one axle and spaced by spanner bushings. The capacity is 4000 lb. per caster. All three wheeels turn on Timken bearings. In the 9-in. square swivel ½-in. balls running in hard-

ened raceways carry the vertical load while lateral load is taken by a Timken bearing. All bearings are lubricated through Zerk fittings. The caster is known as special 1212 MSTT.

Doughnut Tires

INSTEAD of the conventional valve in the center of the tire and projecting through a hole in the rim, the valve is entirely outside the rim in the new Doenut tires manufactured by the *Musselman Products Co.*, 6326 St. Clair Avenue, Cleveland. The valve is of a short flexible rubber construction located so as to be free from rubbing or scraping damage. This location also completely eliminates valve damage caused by creeping from running tires under-inflated. The tire is built in three sizes: 10 x 2.75 in.; 12 x 3.30 in., and 16 x 4.40 in.

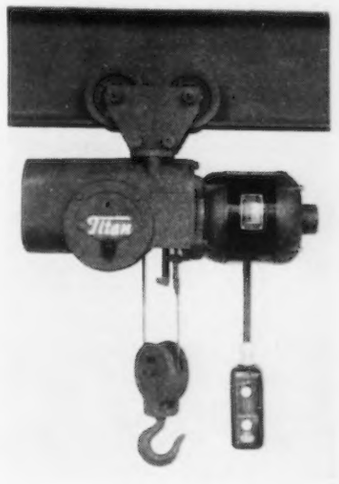
Electric Hoist Units

TWO new sizes of the Load Lifter Jr. line of hoists, of 500 and 1000 lb. capacity respectively have been announced by the *Shaw-Box Crane & Hoist Division, Manning, Maxwell & Moore, Inc., Muskegon, Mich.* These hoists are of the low headroom type for heavy duty service and are of the wire rope and drum style. On both sizes the hook in its highest position comes within 12¼ in. of the bottom of

the beam on which it travels. They are available in lug suspension, hook suspension and combined with a push type ball bearing trolley for operating on either I-beams or standard monorail track sections. Forged steel gearing is used in the drive and ball bearings are used throughout. Pendant cord or push-button control is available. Single phase or polyphase motors are offered.

Electric Hoist

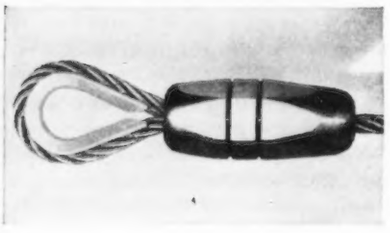
AREA contact Cone-Drive worm gears are used in conjunction with a pair of helical gears in a new line of small electric hoists, recently



put on the market by the *Detroit Hoist & Machine Co.*, 8201 Morrow Street, Detroit. Compactness and light weight are achieved by this design. The hoists are fitted with ball bearings throughout, and are powered by ball bearing, fully inclosed motors, operating on either 110-volt single phase circuits or on 110, 220 or 440-volt polyphase. These Titan hoists are available in capacities of 250, 500 and 750 lb. Hoisting speeds are 60 ft. per min. Load is sustained by an electric solenoid brake. They may be supplied with upper hook suspension or with a four-wheeel trolley, with the hoist attached either parallel to or at right angles to the runway track.

Wire Rope Clamp

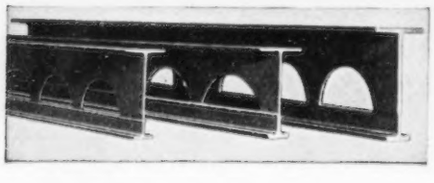
SAFE-LINE is the name given a new wire rope clamp that is free from projecting bolts and nuts. The severed ends of the wire strands are completely inclosed so as to prevent injury to workers. Wire rope slings can be readily made up with this clamp by an unskilled worker. The



device consists of two taper threaded sections which are placed on the exposed sides of the wire rope, and two taper nuts which squeeze the two halves together when the nuts are tightened. They are said to grip the rope with a strength greater than the rope itself. Safe-Line clamps are made entirely of alloy steel forgings and are coined to accurate size. They are made by the *National Production Co.*, 4561 St. Jean Avenue, Detroit.

Tramrail Arch Beams

A NEW series of tramrail arch beams for overhead load material handling systems for loads up to 5 tons is announced by the *Cleveland Tramrail Division* of the *Cleveland Crane & Engineering Co.* No. 3000 has a depth of 12 in. and weight of 28 lb. per ft.; No. 3100, a depth of 12 in. and a weight of 33 lb. per ft., and No. 3200, a depth of 15 in. and weight of 50 lb. These arch beams consist of a wide flanged T-member to which is welded a specially rolled rail. The vertical web member of this T-section is arched at intervals, reducing the weight without sacrificing strength. The high carbon steel rail has a hard, flat raised tread or running section and is said not to pein down from the rolling action of the carrier wheels. Arch beam is supported by means of a ball and socket swivel connection at the ceiling or superstructure and at the top of the flange beam, providing completely flexibility in an overhead monorail system.

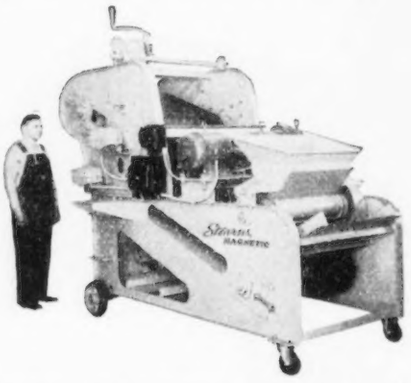


Sheet Lifter

ESPECIALLY designed for handling narrow sheet steel, two packs at a time, is a new style of swivel leg sheet lifter, built by *Cullen-Friestedt Co.*, 1303 South Kilbourn Avenue, Chicago. The illustration shows a six-leg lifter lowered in position to pick up two bundles side by side. The prongs are swiveled to a position at right angles to the material before lifting takes place. The chain wheel is used to bring the vertical legs into contact with the sides of the sheets. The unit shown has a capacity of 7 tons and is capable of handling single packs ranging in width from 15 to 30 in. or two packs of a total width of not over 30 in. Legs are spaced 48 in. apart to correspond to roller spacing on runout table. The swivel movement of the legs is made through spiral gears on each leg and is controlled by levers on each side.

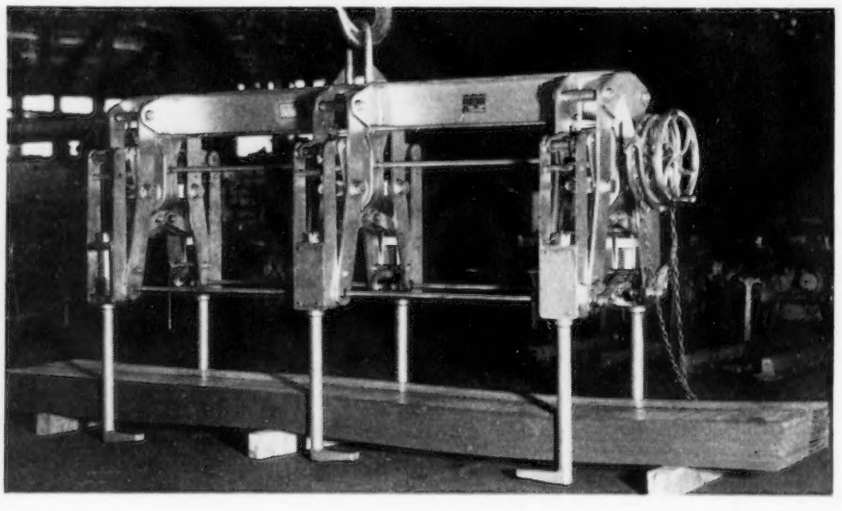
Magnetic Pulley Separator

BY combining two magnetic pulley separator units in one machine, *Stearns Magnetic Mfg. Co.*, Milwaukee, has provided an effective means of separating iron turnings and borings from brass scrap used in smelter plants. In the unit shown, the upper



pulley, with vanner edge and tail pulley, is 15 in. in diameter and the lower, 12 in. Both are 30 in. long. In the process of separation, the coarse material, large and irregular pieces, is picked up by the upper magnetic pulley while the lower one serves as a refining separation. The material is fed either into the bulk hopper with louver type feed or into the chute below. Long and odd shaped pieces are fed into the lower chute. A winch is provided for raising the upper magnetic pulley to accommodate the various sizes of material being treated. This type of separator can be furnished in a variety of sizes.

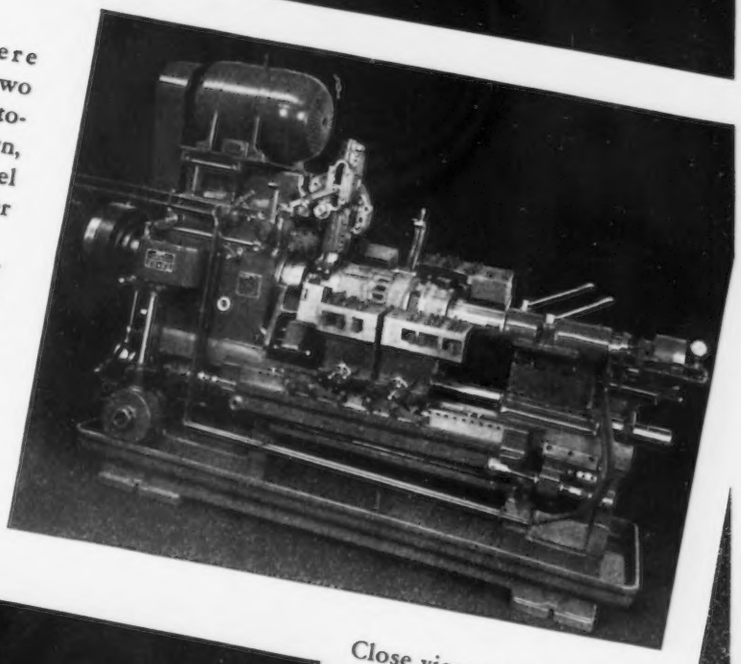
The unit shown is equipped with well protected generator and gearhead motor to suit particular electrical requirements, although magnetic pulleys ordinarily operate off d.c. Casters can be furnished where it is desired to move the separator to various piles of materials.

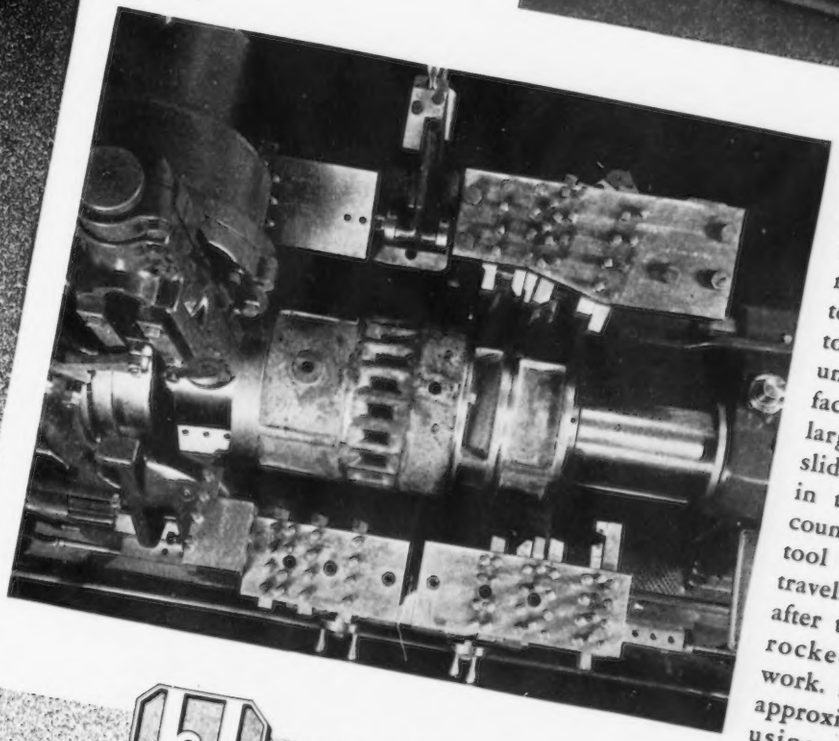


HOURS *reduced to* minutes!

Production Hours were reduced to Minutes when two Jones & Lamson Fay Automatic Lathes were used to turn, face and form this Diesel Engine cast-iron cylinder liner in two operations.

Perhaps we can make similar savings for you. Jones & Lamson Engineers are always ready to study your problems, with no obligation, and demonstrate the investment value of Fay Automatic Lathes.





Close view of tooling with work in position. The carriage turns the O. D. while the back-arm faces, chamfers and forms. An auxiliary slide under the back-arm tool block carries two tools to form the semi-circular undercuts. An auxiliary arm faces the counterbore in the large end and the overhead slide cuts the spiral groove in this counterbore. The counterbore is sized by a tool on the carriage that travels toward the tailstock after the other tools have rocked away from the work. Floor to floor time approximately 7 minutes, using cemented carbide tipped tools.

JONES & LAMSON MACHINE COMPANY

SPRINGFIELD, VERMONT, U. S. A.

MANUFACTURERS OF: SADDLE & RAM TYPE UNIVERSAL TURRET LATHES . . . FAY AUTOMATIC LATHES . . . AUTOMATIC DOUBLE-END MILLING & CENTERING MACHINES . . . AUTOMATIC THREAD GRINDING MACHINES . . . COMPARATORS . . . TANGENT AND RADIAL, STATIONARY AND REVOLVING DIES AND CHASERS

PROFIT PRODUCING MACHINE TOOLS

On The Assembly Line

BY W. F. SHERMAN
Detroit Editor

• This week marks beginning of actual production of 1941 models in some automotive plants . . . Defense program expected to benefit sales . . . Detroit not yet widely engaged in work for national defense program

DETROIT — July 4 marks the beginning of model changeovers for the automobile industry. Some plants are already through with 1940 car production, and it will be a matter of only two weeks before important units in the industry begin production of parts for 1941 models.

Appraising the current situation requires a look at the merchandising end of the business as well as production, because the sales situation always governs the start of new model output and time of announcement of the new models to some degree.

The annual "clean-up period" is here now and the condition of the automotive market is considered by most authorities to be abnormal. The National Automotive Dealers' Association has asserted that June new car inventories were at a higher level than ever before, with used car inventories at a high peak. Mitigating these factors, sales of all vehicles have been keeping pace so that ratios are not particularly out of balance.

Observers concur in the belief that current inventories are sufficient for six to eight weeks. At the same time the industry is perhaps less than a month away from the first announcement of a 1941 model car. There is also some indication that a heavy proportion of 1941 announcements might come in less than eight weeks. Some tentative announcement dates are so close that they may have to be postponed week by week or day by day to permit field stocks to be moved out of the way.

Wild trading is an industry-wide characteristic today, partly as a result of the slump which occurred in May when buyers apparently were frightened by Nazi successes in the Lowlands. To keep car sales up at the spring level, dealers increased allowances on trade-ins and so far have not been able to regain control of their prices. However, retail sales in June showed less than seasonal declines and there are indications that summer and early fall may see contra-seasonally high sales.

Larger Sales Expected

The influence of the defense program on automobile sales is expected to be beneficial. The anticipation is that fatter pay envelopes will result in more automobile buying, both new and used cars. In the case of any full-out war program the industry looks, of course, for sharp decreases in sales. Incidentally the Canadian auto industry, busy with military orders since the war began, has sold more passenger cars this spring than it did last spring, but recently the sales curve has gone downward.

Higher automobile prices are freely predicted here, although the extent of increases is difficult to estimate. Price increases will be based upon extra cost of certain materials and parts and on some labor increases which have occurred. Also, there is likelihood that prices will anticipate higher taxes. Getting specific information about prospective price increases is almost impossible at this time, but the tip-off is that automobile people (who, in general, do not get discounts) are buying cars now because they "feel" that prices are going up in the fall.

A general impression, even in steel trade circles, that hardly any buying has been done for 1941 models is not quite justified. The fact is that buying has been widespread, but piecemeal. There have been no big blanket orders for tens of thousands of tons to talk about. Automobile people have covered quietly but effectively as rapidly as they were able to determine requirements. Most of this has occurred in the last month and has been accelerated in the last week. The piecemeal ordering is attributable partly to the fact that when automotive buyers were ready to secure tonnage for 1941 models there was a lot of uncertainty engendered by fast-breaking war news and announcements about the impending defense program. Tonnages ordered during that period have been small, just enough to get the new models into production, no more. There is now, however, a tendency to buy farther ahead, particularly where electric furnace alloys are used. There is plenty of reason to believe, according to automotive buyers, that the aircraft defense program may absorb such alloys and leave automobile plants wanting them.

Not Much Defense Work Yet

From all over the country come insistent queries to Detroit which indicate a widespread impression that this area is already engaged in mass production programs on defense materials, or that at least Detroit is busily engaged in tooling up for such programs in the defense set-up. The inquiries are of such a nature that they indicate an interest on the part of industrialists in following developments closely.

A survey of local activity shows that the only important programs actually being carried out are those involving the machining and finishing of aircraft engine parts and accessories. In addition, work has been going on for several months in die shops which have received contracts from aircraft manufacturers to supply tooling principally. In addition to this actual production of aircraft parts, tools and dies, some 10

More than A machine

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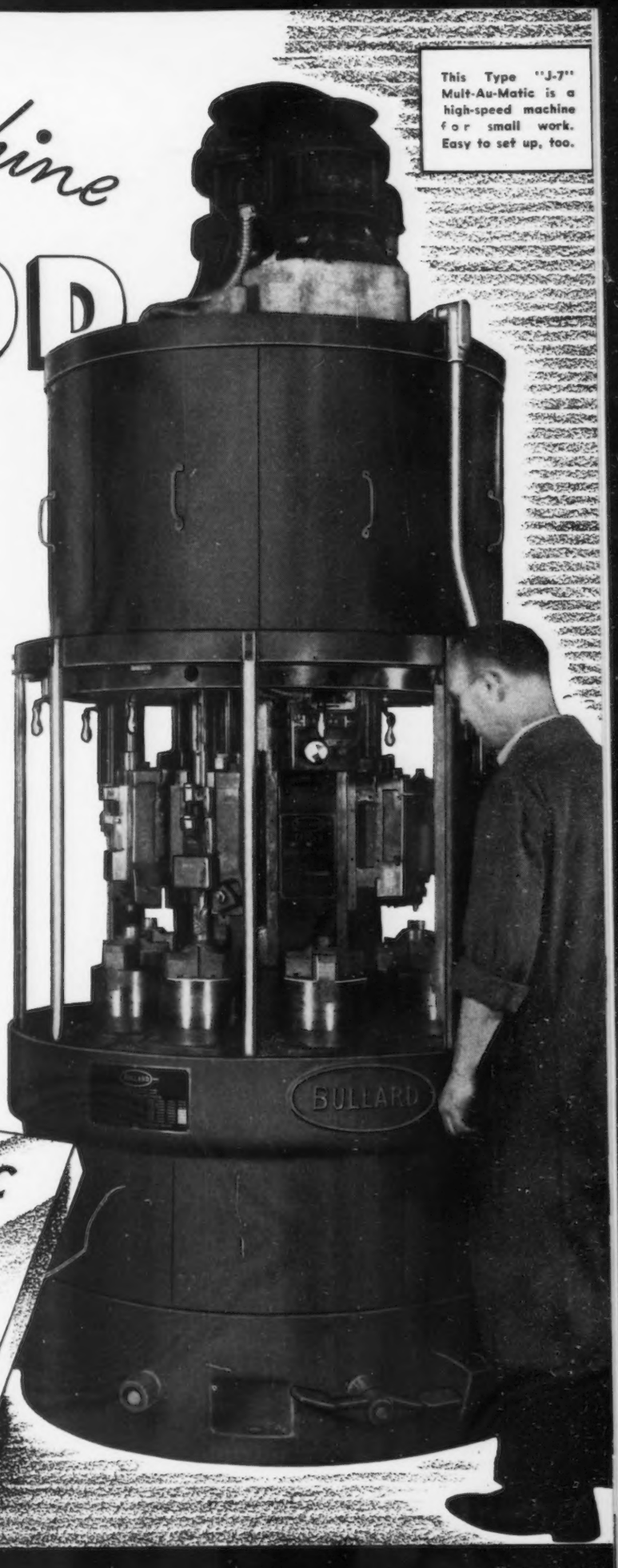
If you're in a real hurry, you don't bother to figure the few minutes' difference between rival train times—you take a plane.

Likewise in the shop—when you need that extra time, you select a machine with a *method* which will get the job out in a hurry and keep on doing it. The Mult-Au-Matic Method of independent feeds, independent speeds, and simultaneous operation means that often 20 to 25 individual machining operations can be completed in the time of the one longest individual operation plus a few seconds' indexing time.

If you have production jobs involving turning, facing, boring, chamfering, threading, drilling, reaming, etc., ask us for time estimates by the Mult-Au-Matic Method. There is no obligation involved.



This Type "J-7" Mult-Au-Matic is a high-speed machine for small work. Easy to set up, too.

THE MULT-AU-MATIC METHOD..
Independent Speeds
Independent Feeds
Simultaneous Operation

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to 15 million dollars' worth of educational orders have been placed, starting last fall. Some of these have been completed, others are still in the tooling-up stage. Those on which tooling has been completed have generally required only a few days' run in the plant after the tools and equipment had been made ready for production.

Many of the important educational orders are still being readied for production. One large firm has four such educational orders, placed since the first of the year, but does not expect to be in production even on the educational quantities for about six weeks.

No one seems to be in a position yet to estimate with any degree of accuracy the volume of work likely to be placed in the Detroit area, nor even its exact nature. The complete picture has changed little on the surface in the six weeks since defense preparations became a subject of major industrial interest. The interval has been occupied principally with investigations, studies and negotiation with Washington. Developments are anticipated daily, however, by the firms which have made preliminary steps.

Chrysler Considering Airplane Engines

CHRYSLER is approaching the time at which important decisions will be revealed about its position in the defense program. The question of production of aircraft engines is probably one of the most important before officials of the corporation now. One radical design is receiving a lot of attention, and it is assumed that some conventional designs are being weighed at the same time. The National Defense Commission has indicated that the Rolls Royce engine was put up to Chrysler about a month ago as a possible military product.

The Chrysler position in the defense program was the subject of a recent talk by K. T. Keller, president, at Salt Lake City. He revealed that a special ordnance manufacturing division of the corporation has been formed.

Besides thousands of Dodge trucks and reconnaissance cars which have been made and are now being made for the Army, Chrysler is tooling up on orders which "include almost a half-million dollars' worth of work on such items as fuse bomb noses, forging and machining shells and the making of cartridge cases," he revealed. These, it is understood, are educational orders and have resulted in no production so far. Keller also indicated the corporation's willingness to cooperate further, and said that Chrysler is "working very diligently on preparations for other major equipment for the Army which I do not feel at liberty to discuss at this time."

GM to Increase Allison Engine Output

GENERAL MOTORS also has a large volume of truck work which has been mentioned previously and, like Chrysler, is engaged in several Army educational projects. The big GM job, of course, is to increase the output of Allison engines to the point where they will become an important part of the aircraft power plant output. So far, the Allison plant has been handicapped by continuously outgrowing itself. The new plant was hardly opened when extreme demands for volume production was thrust upon it. Expansion has hardly kept pace with requirements. Meanwhile, the technicians at the plant and at Cadillac are understood to have been hard put to attain the accuracy required in aircraft engine work and meet all the minute requirements of inspectors.

General Motors Diesel organization has not yet been called into the defense picture prominently, but there are indications that it is about to be. The small Diesel power plants produced commercially for trucks, marine conversion and package power units have not been in power ranges which are needed for various defense purposes. However, recently GM Diesel completed an engine which delivers approximately 300 hp. and is considered ideal for medium tanks. Now the Detroit Diesel Division is doubling its plant capacity. A 600 by 280-ft. addition on which construction is to start immediately was announced Monday, July 1, by W. T. Crowe, general manager. Total floor space in the enlarged plant will be 379,000 sq. ft. The present plant was put in service January, 1938, and produces the small series of GM Diesel engines, while the huge railroad type Diesels are built at the Electro-Motive Corp. in La Grange, Ill., and marine engines are the product of the Cleveland Diesel Engine Division. The original plant had a capacity of 3000 engines a year, of which more than 5000 have gone into service in this and 25 other countries since the Detroit plant was opened.

Complete Dieselization of railroad motivepower is a practicability, according to R. K. Evans, vice-president in charge of GM Diesel development. He has predicted a new and perhaps more important field of service for application of Diesel power in a freight locomotive "so flexible and powerful as to be economically applicable in every kind of freight service," correcting the somewhat widespread opinion that Diesel power is applicable only to lightweight, high-speed trains. He said that the Diesel has its biggest opportunities in handling heavy-duty jobs.

Auto Production Tapering

AUTOMOBILE production last week tapered still more toward the shutdowns that will come in the next few weeks. Output during last week was 87,550 passenger cars and trucks compared with 90,060 in the previous week and 70,663 in the corresponding week of last year, according to Ward's Automotive Reports. The relatively high rate of production at this season of the year, in view of the somewhat critical field sales situation, augers for an abrupt termination of assemblies rather than the kind of downward spiral that is more common to the automobile industry.

Late developments in the Ford program for manufacture of airplane engines for defense will be covered on another page in this issue of THE IRON AGE.

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The IRON AGE *is Moving*

« « After 29 years on West 39th Street, The Iron Age now moves its editorial and executive offices to 100 East 42nd Street — Pershing Square Building. « « This new location, just across the street from the Grand Central Station, is in the heart of the uptown office district within easy reach from all transit lines. « « We hope that the convenient location will make it possible for you to visit us more often.

Washington

BY L. W. MOFFETT
Washington Editor

• Orders for military supplies soon to swell to large volume . . . Surveys of resources, aimed to avoid mistakes of 1914-18, will permit earlier placing of contracts . . . Pennsylvania leads in war equipment plants.

WASHINGTON — With billions appropriated by Congress, the Government is speeding activities to bring about a gigantic transformation of industry from plowshare to sword production. As shown by the rapid fall of great, unprepared nations before the terrific blitzkreig of a prepared, ruthless invader, war has become more than ever a matter of materials, fabricated into machines of frightful destruction. Thus industry has become the first line of defense.

Though disturbingly belated, the United States has turned to its industry, the most vast and varied in the world, as the industrial mobilization program begins to crystallize. Orders for military supplies of thousands of kinds will swell into large volume soon, and it is estimated that within six months production of national defense requirements will be gaited to a high scale.

Thanks to surveys and educational orders the Government knows where to place orders quickly. It knows the peace-to-war conversion possibilities of production. Flexibility that is ironic has been determined. Plants that make instruments from which come music, laughter and comedy will be called upon to manufacture bomb fuses, since this task has been assigned to the radio and phonograph manufacturer. The horse, not having disappeared entirely from the battlefield, the manufacturer of pipe organs will made saddle frames. The steel and metal-working industries with their great contribution to peaceful society, will be turned to production of enormous quantities of a myriad of products for war-projectiles, shells, forgings, guns, and so on.

10,000 Plants Listed for Changeover

IN the files of the office of Assistant Secretary of War Louis Johnson is a carefully indexed record of 10,000 accepted manufacturing plants whose facilities can be turned from peace to war production. In all the War Department has surveyed 20,000 plants, or about one out of every 10 in the United States. The capacity of each is listed. By codes is shown how much of the capacity can be used for a given plant for specified defense needs. Symbols indicate the case history of producers with reference to their commodities. Turning to these records the War Department knows where to turn at once for the production of the 70,000 items that are required to equip an army for field service.

As Assistant Secretary of War Johnson has pointed out, it is intended to avoid needless waste, confusion and danger incident to involvement in a major conflict by assuring prompt mobilization of the nation's industrial resources. The system was set up to prevent repetition of the industrial mistakes of 1914-18, to rally materials to national support with a minimum of delay, a maximum effectiveness and to facilitate post-war rehabilitation as expressed in the War-Navy report on the industrial mobilization plan of 1939. There will be no repetition of competitive bidding between the War and the Navy departments such as occurred during the first World War in their mad scramble for material. The maximum "war load" contemplated for any plant is 80 per cent of capacity. The purpose is to leave the remaining capacity for normal commercial needs.

There are three principal manufacturing industrial mobilization problems:

1. Difficult items that require minor conversion from normal products and for which production possibilities are less than requirements. To meet this problem the War Department allocates specific plants and obtains accepted schedules of production. There are about 3700 such items. Examples given of such products are shoes, blankets and motor vehicles.

Some Have No Commercial Counterpart

2. Critical items of munitions. There are 255 of these. Examples given were bomb sights, gun parts, fire control instruments, searchlights, gas masks, armor, special alloy steel and optical instruments. These items, which have no commercial counterpart, are the basis for the educational order program. Under this program the Government selects plants that are to be instructed and tooled to produce highly intricate military equipment.

3. Stockpile items. These items are the basis for the present rearmament program and are essential to equip existing units or for standby units to be mobilized early in an emergency for the production of such highly important lines as airplanes, tanks and parts for heavy and medium artillery. In the category of stockpile items are such strategic raw materials as tin, manganese, chromium, tungsten, nickel, rubber, mercury, silk and quinine.

Of the 10,000 plants allocated for munition purposes, Assistant Secretary of War Johnson has pointed out that more than 4000 are located in the area that extends from Boston to Wilmington, Del., and west to Pittsburgh. Pennsylvania, the leading steel producing state, has the greatest number of allocated plants—1431 of them. New York has 1101; Massachusetts has 711; Connecticut has 349; Rhode Island has 148; New Jersey has 42 and Delaware has 29.

At last!

A HEART THAT WON'T STOP BEATING

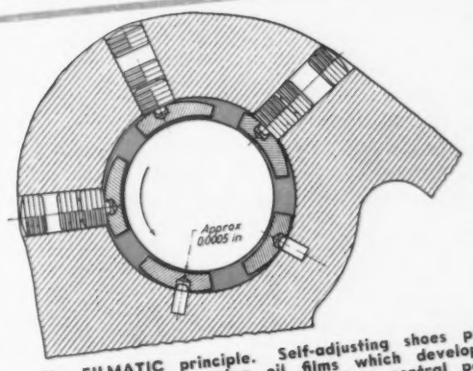
Every machine has a "heart"—an all-important member that gives the machine its ability to do the kind of work for which it was intended. In a grinding machine, it's the wheel spindle. When the wheel spindle stops, grinding stops; and, of course, production also stops. Fixed charges, burdened with additional shutdown expenses, go right ahead.

FILMATIC bearings, available only in Grinding Machines labeled with the CINCINNATI trade-mark, have increased the life expectancy over conventional bearings from months to years, with the final ratio still increasing. Then, too, other benefits have accrued:

1 Reduce wheel truing and thereby lower wheel cost per piece.

2 No adjustment for varying grinding conditions as encountered when changing from roughing to finishing.

3 Spindle "flutter," a common source of "chatter," completely eliminated.



The FILMATIC principle. Self-adjusting shoes produce independent, converging oil films which develop high radial pressures, forcing spindle into central position. FILMATIC bearing construction is fully protected by U. S. and Foreign patents.

Investigate now the profit possibilities of CINCINNATI Grinding Machines equipped with FILMATIC bearings. A booklet describing these bearings, No. G-446, will be mailed on request.

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Trade Mark Reg. U. S. Patent Office

New CINCINNATI 12" Hydraulic Universal Grinding Machine has FILMATIC spindle bearings. Write for your copy of the catalog, G-448.

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U. S. Manganese Mines Reported Forced To Close

Washington

• • • **J. Carson Adkerson,** president of the American Manganese Producers Association, said last week that domestic manganese mines recently in operation are being forced to close on account of no market while millions are being appropriated for national defense and the cry is being heard that the United States may not be able to get any manganese from any foreign sources whatsoever.

Pointing out that for years domestic manganese producers have vigorously recommended development of domestic manganese resources for national defense, Mr. Adkerson said that there had been repeated government calls for bids on manganese "with little results." This was pointed to as conclusive proof that sufficient quantities of manganese ores of the required grades are not available from either foreign or domestic sources.

"Foreign ores are of various grades and are mixed and blended by the ferromanganese manufacturers to meet the specifications desired," Mr. Adkerson added. "Domestic ores are likewise of various grades and should be blended to meet specifications.

"Our country will consume probably 1,000,000 tons of manganese ore during the next 12 months. Domestic shipments are now at the rate of 42,000 tons per year. During the war-year 1918 domestic mines shipped 305,000 tons. However, it takes time to get mines developed and plants installed to concentrate ores to the proper grade.

"With all possible speed, concentrating and beneficiating plants should be established at central points in the manganese areas in the United States; both high and low grade ores should be produced and the ores blended or beneficiated to meet the specifications required.

"Private industry has substantial stocks of manganese on hand but the country faces an increasingly dangerous situation as current supplies become exhausted. The time has come when we must throw off international influences in our midst and look first to the development of our own manganese resources."

THE BULL OF THE WOODS — BY J. R. WILLIAMS

WHO'S THAT-- HIS SON? HE'S GOT THE OLD MAN LOOKIN' LIKE HE WAS TH' HELPER!
THEY DON'T HAVE TO BE YOUR SON TO PUT THE OL' MAN INTO TH' BACKGROUND! WHEN I WAS YOUNG WE LOOKED UP TO EXPERIENCE-- NOW TH' KIDS THINK YOU MUST HAVE BEEN A FAT-HEAD TO TAKE SO LONG TO LEARN WHAT YOU KNOW-- BUT THEY FERGIT THAT THERE WASN'T SO MANY THAT KNEW SO MUCH THEN... AN IT TOOK LONGER
7-5
J.R.WILLIAMS
COPR. 1940 BY NEA SERVICE, INC.
THE LONG ROAD AND THE SHORT
T. M. REG. U. S. PAT. OFF.

German Barter Deals Affect Our Trade in S. A.

• • • **Reports from South American** countries indicate that exports of American steel and other products are being affected by barter deals which the Germans and Italians are offering. A dispatch to The New York *Times* from Buenos Aires states that "A question is raised as to what extent the German offers of barter are made for propaganda purposes. Regardless of that possibility, they are effective in cutting the United States sales."

Attention was first called to the German offers in THE IRON AGE of June 20, page 95, which said:

"German steel companies are offering steel in South American countries at prices below American quotations with a cash guarantee of delivery by October, thus carrying out the Reich's timetable tactics to the point of planning for post-war trade re-establishment."

Confirming this report, the correspondent of *The Times* in Buenos Aires also states that "Nazi agents already are trying to negotiate gigantic barter deals in the rich South American field, particularly in Argentina, a well-informed source said today (June 26).

"Their aim, this source said, is to strengthen Germany further by cutting off Argentina and Uruguay and other South American nations from close economic and military cooperation with the United States."

And from Rio de Janeiro, *The Times* correspondent reports that "German commercial agents are said to have been instructed to book orders for German goods for shipment to Latin America in October and November."

Canada's War Spending To Be Billion in 1940

Ottawa

• • • **Finance Minister Ralston** advises that over $1,000,000,000 will be required in 1940 to finance Canada's ever expanding war effort.

Carboloy Tools Step Up Production of Aluminum Aircraft Parts

Carboloy tools rough and finish face this aluminum aircraft part. Finish facing is done at a speed of 570 f.p.m., with a feed of .002".

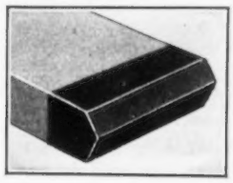
.003" depth of cut. Tool life exceeds the 540 pieces in each lot. This application is but one of many jobs on which Taft-Peirce Manufacturing Company has applied Carboloy cemented carbide as a "general purpose" cutting material. This widespread use of Carboloy has resulted in an over-all production increase of 25% on the jobs where it has been applied.

Carboloy Tool Removes 20 lbs. of 1040 Steel Per Minute

Indicative of the trend towards the use of cemented carbide as a tool material for broad general purpose use in the shop rather than for a few hand picked production applications, is the report recently received from an Oklahoma job shop. This shop reports the use of Carboloy tools on "every conceivable job in the shop." One job specifically mentioned is the turning of heat treated 1040 S.A.E. forgings at 300 f.p.m., .036" feed, with the cut ranging from $\frac{3}{8}$" to $\frac{7}{8}$" deep. 20 lbs. of steel are removed per minute, using a $\frac{7}{16}$" sq. Carboloy tip, $1\frac{1}{2}$" long, with a ground-in chip breaker. Another operation mentioned is the grooving of large cast iron sheaves from the solid at the rate of one groove every $1\frac{1}{4}$ minutes. A lot of 114 grooves were turned without grinding the Carboloy tools.

Speed Up Machinery Reconditioning with Carboloy-Tipped Scrapers

Increased production in many plants is taxing present machinery heavily and as a result of this many manufacturers are reconditioning their old equipment to meet production schedules. Carboloy-tipped scrapers are proving especially helpful in this work as they stand up for long periods of use. Fewer sharpenings means more time spent scraping. One large machine tool builder recently ordered a large quantity of these scrapers as they found that they lasted 2 or 3 hours against 2 to 4 minutes for steel scrapers. Carboloy-tipped scrapers in the hands of an experienced grinder, can be resharpened in a few seconds with a diamond wheel. Complete information can be obtained from Carboloy Company, Detroit.



Recent Carboloy Literature

Manual GT-122, recently issued, gives the latest technique for the rapid, economical grinding of Carboloy tools. It explains in detail the various operations required to free hand grind single point tools, presents grinding machine requirements and offers grinding wheel recommendations. Write for your copy.

Taft-Peirce MFG. CO.
USES CARBOLOY
TOOLS PROFITABLY
ON JOB-LOTS AS LOW AS ONE PIECE!
AGAIN—the general purpose use of Carboloy tools on small-lot, diversified work
. . . PAYS DIVIDENDS!

In addition to its well-known line of steel and carbide-tipped gages, the Taft-Peirce Manufacturing Company, Woonsocket, R. I., produces a large volume of contract work. This involves the machining of all common metals, such as steel, cast iron, aluminum, bronze, etc., and their alloys, in job lots which range from 1 piece to 1,000 or more pieces per lot, average quantities being between 24 and 75 pieces.

Some months ago, Taft-Peirce set out to determine whether Carboloy tools could be employed profitably on this diversified small-lot work. As a result, the following plan was adopted: (1) A "carbide application man" was appointed within the plant to follow and maintain all carbide tools, (2) A minimum number of carbide tools were designed, each suitable for broad general purpose use on many diversified jobs, (3) General purpose carbide grades of wide application were selected.

Today a relatively short time since its introduction, this general purpose carbide program is producing outstanding results. About 30% of all cast iron jobs and 20% of all steel jobs are machined profitably with Carboloy general purpose tools, and each day adds to this growing use. Significantly, Taft-Peirce can now apply carbides profitably even on 1-piece lots.

We shall be glad to discuss the benefits of a similar program on your own small-lot work.

CARBOLOY COMPANY, INC., 11153 E. 8-Mile St., DETROIT, MICHIGAN

CHICAGO • CLEVELAND • NEWARK • PITTSBURGH • PHILADELPHIA • WORCESTER, MASS.

CARBOLOY

REG. U.S. PAT. OFF.

The Mark of CARBOLOY

TUNGSTEN CARBIDE—TANTALUM CARBIDE—TITANIUM CARBIDE

FOR CUTTING, DRAWING, SHAPING, EXTRUDING METALS AND NON-METALLICS
★ FOR REDUCING WEAR ON EQUIPMENT OR PRODUCTS YOU USE OR MAKE ★

Fatigue Cracks

BY A.H.DIX

Suggestion

• • • A postcard postmarked New York reads:

"I see where you are looking for a new name. I think you need one. How about "LOWLIGHTS OF INDUSTRY?"

—*The Constant Nympth.*

We like it, but how will it go over in the West?

Shift to the East

• • • In the '90's the most exciting section of New York was Hell's Kitchen, whose center was W. 39th St. and 8th Ave. Hell's Kitcheners never died of ennui, for it was an offnight that did not yield a dozen cracked skulls and a couple of murders.

But the gangs got middle-aged and at the turn of the century the neighborhood embarked on a career of dull respectability. It was at about this time that things began to get a bit crowded in THE IRON AGE offices downtown on William Street, and in 1911 the whole works moved uptown to 239 W. 39th St., a No. 7 iron shot from Hell's Kitchen's former focus and the Metropolitan Opera House.

Then for a decade and a half the quietness of the neighborhood was broken only by the bass rumble of printing presses and an occasional screech from a soprano being given a tryout by Gatti-Casazza. A church stood on the corner of 39th and 7th; brownstone houses flanked us; a bucolic aura enveloped us.

Then came progress. During the two-chickens-in-every-pot-days the cloak and suit industry was rousted off Fifth Avenue. It came to rest in the West Thirties, and almost overnight the complexion of the neighborhood changed. We would ask visitors to meet us in the Automat, or, if they were full-page advertisers, in Childs'. Those who tracked us to our lair would see our name on the building, say "I don't believe it," and walk away. Hardy souls who followed through could hardly wait until they got home to cancel their subscriptions.

But that is now all past. A moving man has just tied a shipping tag onto our typewriter, and between the time this is written and the time you see it your favorite family journal will have moved to shiny new offices at 100 East 42nd St., which is the Pershing Square Building, opposite the Grand Central Station. We will be proud to have you call. Get off at the fifth floor.

Squawk

• • • One of our less passionate admirers complains about the use of profanity on this page and says he has also been able to detect some "sexy" references. We cherish every one of our eighteen loyal readers and are grieved when we give offense. But Hell's Kitchen is what it was called, and H——'s Kitchen only makes things worse, because the reader mentally fills in the missing letters anyway and the word is impressed even more deeply on his mind, as when you tell someone to think of anything but elephants.

As to the "sexy" part of it, we have gone carefully through our scrapbook and can find nothing worthy of the rebuke. Maybe he has use mixed up with our contemporary columnist, "Random Shots," of the English *Foundry Trade Journal*, who says that the present phenomenally heavy sale of ladies' silk stockings in England is due to ladies wishing, at this critical time, to put their best leg forward.

Pipeline to Moscow Signs Off

• • • The bad word occurs again in a letter from the "S.W.," the anonymous Chicagoan who has been bombarding us weekly for years with penciled notes about the promised land. This is the latest and probably the last:

"Well, now that I'm moving out of town shortly—and the hunt is on so hot for 'fifth columnists'—I'll not be favoring you with my notes any more.

"I'm in favor of the original definition of a Fifth Columnist—'a Spanish property owner who willingly sold his native Spain to Germany and Italy to avoid having to cope with democracy at home.'

"Truly Fascism blooms in America in the name and under the guise of anti-Fascism—loud talk against Fascism, and action only against Communists and the working class.

"When believing in democracy—in the common people—in peace and security and jobs for all—billions for our own citizens and not for war—makes one a fifth columnist, I say to hell with it."

The headline in tonight's paper is, *"Soviet Speeds Defense with 6-Day Week."*

High-Spirited Exit

• • • The aim of this page is to reflect life in the industry. We would be untrue to our mission were we to portray a scene of perfection, in the face of occasional and altogether natural lapses from grace. For instance, one of our representatives who called on a recent delinquent Chicago subscriber reports:

"Cancel this sub. The gentleman has been on a drunk for thirty days and has been fired."

Backpat, With Slight Scratch

• • • Then there are our young lady readers to consider, for example, Miss Esther J. Ticknor, of the Hallstead Iron Foundry, Hallstead, Pa., who writes:

"For the past six years of reading THE IRON AGE, I have been very much impressed with the editorials, and also *Between Us Two*, which is now *Fatigue Cracks*. You are correct in saying the latter column could have been better named.

"I always read the editorial first as it is so 'down to earth' that any ordinarily intelligent person can understand it and see its true meaning."

Love Letter

• • • "The five cats will catch the 100 rats in 100 minutes (your June 20 problem), if they don't get tired. Please send the diploma *summa cum laude*, signed by John H. Van Deventer. I not only enjoy *'Fatigue Cracks,'* but the entirely family paper as well. Congratulations on the new format."

—*W. D. Snyder, The Ajax Mfg. Co.*

Double Shift Does It

"Ordnance Plant Employee" submits a puzzle in his contribution to your page in the June 20 issue. May I try an answer?

Six 7-hr. shifts 6 A.M. to 1 P. M.—42 hr.
Six 7-hr. shifts 1 P.M. to 8 P.M.—42 hr.
Recess for a snack at 10 A.M. and 5 P.M.

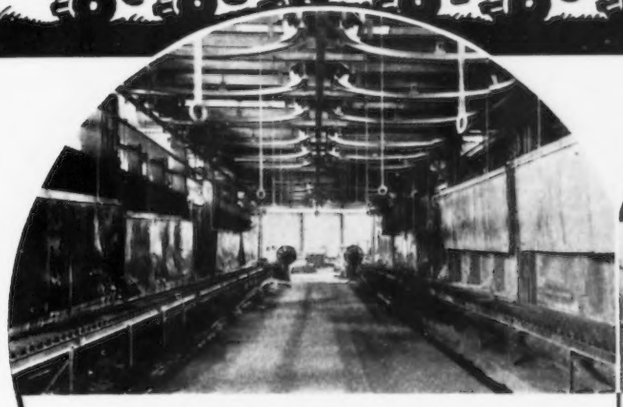
This is how a company with limited equipment would handle 84 hr. a week. It assumes, of course, finding or training the men. It spreads the work and gives ample time for the "more abundant life."

—*J. L. O'Brien, Treasurer,*
Economy Engineering Co., Chicago.

Puzzle

A small gear has eight teeth, numbered one to eight. It meshes with a 24-tooth gear. The "1" on the small gear starts in an upright position. If it is revolved around the larger gear, how many times does the "1" assume a vertical position in one complete revolution?

"SALEM" is prepared for defense!

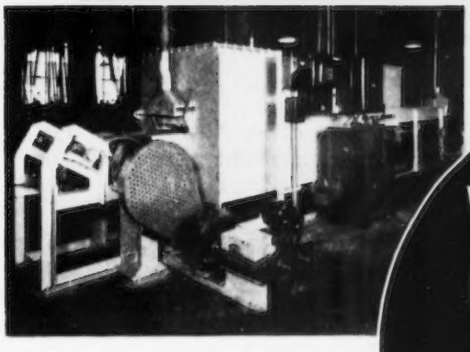


Double Chamber Batch Type Billet Heating Furnaces for heating billets for forging into shells.

Car Type Furnace for Carburizing Armor Plate

SALEM FURNACES ARE FLEXIBLE

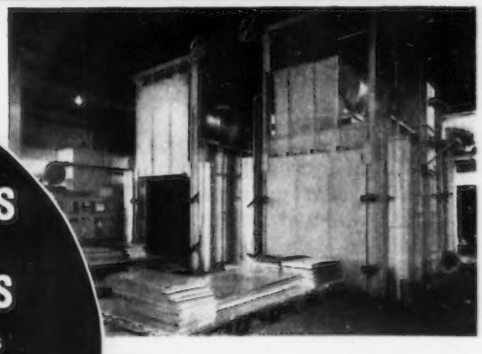
GEARED TO TODAY'S HIGH PRESSURE PROGRAMS — BUT DESIGNED FOR ADAPTION TO DIVERSIFIED COMMODITY PRODUCTION



Special Atmosphere Electric Furnace with wire mesh belt conveyor for braxing small arms components.

THE WITTER PROCESS FOR FORGING SHELLS

20% Savings in materials
50% Increase in production
Minimum installation cost.
Low operating cost plus minimum maintenance cost. Small floor space requirements.



Convection Heated Car Type Furnace for annealing aluminum sheets for aircraft parts. Convection Unit - Gas - Oil or Electric.

SALEM ENGINEERING COMPANY

SALEM, OHIO.

"SALEM'S" practical and progressive engineers will gladly discuss your problems with you.

CHICAGO - DETROIT
PHILADELPHIA - PITTSBURGH
LONDON - PARIS
WELLAND, ONTARIO

SALEM ENGINEERING COMPANY

News of Industry . . .

Light Plane Production Expanding; Piper Plant Alone Builds 70 a Week

Pittsburgh

• • • **Rapid increase** in production of light aircraft using 40 to 75 hp. engines, a development obscured because of the emphasis being placed on the nation's need for large, high-powered military planes, is being watched with interest by the American metal-working industry.

Last week the Piper Aircraft Corp., Lock Haven, Pa., produced 70 such small planes. It is preparing eventually to expand its capacity to well over 5000 units a year.

Observers here believe that the real bottleneck in building up an adequate air defense for the United States will be found in the training of pilots, a shortage which will be met in part by building of light planes on a large scale.

"When we have 1,000,000 civilian pilots in this country, then we can think about picking the cream to man an adequate air defense of the United States," Major Al Williams, Scripps-Howard aviation expert and aviation manager of the Gulf Oil Corp., told THE IRON AGE this week.

Likening the lighter aircraft training to home work and the actual training of Army and Navy pilots to examination, Major Williams said, "You can't do homework when you are taking examinations and the air homework in this country is in the complete utilization by American citizens of light aircraft."

So far, the leader in production of light planes is the Piper company. Six other companies also producing low powered hp. aircraft are the Taylorcraft Aviation Corp., Alliance, Ohio, which is also expanding its production facilities; Aeronautical Corp. of America, Middletown, Ohio, pioneers in light aircraft manufacture; Luscombe Airplane Corp., West Trenton, N. J., which make an all-metal aluminum fuselage; the Stinson Aircraft Division, Aviation Mfg. Corp., Nashville, Tenn., which, in addition to heavier planes makes the Stinson 105; Funk Aircraft Co., Akron, Ohio; and Porterfield Aircraft Corp., Kansas City.

A rough estimate places the number of private small planes now in service at about 8000 and, although sales 18 months ago were reported to be much heavier to flying schools than to individuals, it is understood now that both groups are about on a par in their requirements. Little known to the public at large and possibly to some steel companies is the fact that even though these light planes utilize fabric and lumber in their construction by far the majority of the weight is steel and aluminum.

Piper Aircraft uses a welded tubular fuselage, while the wing construction is aluminum covered with fabric. The manufacture of these planes cannot be said to be on a mass production basis, although a modified straight line flow is being maintained at Lock

Haven and a closer approach to mass production on a small scale will be obtained after the plant has been expanded. The light weight planes, however, are custom built and the concerns manufacturing them maintain strict control over all the parts and operations, with the exception of the engines which in Piper's case at least are supplied by Continental Motors, Lycoming, and Franklin Air-Cooled. In fact, many of the airplane parts are pressed or punched out with a minimum of scrap loss and new techniques are being developed every day.

Estimates of the amount of steel and aluminum used on the average light aircraft are as follows: The fuselage requires about 500 ft. of assorted sized tubing which includes S.A.E. 1025 and S.A.E. 4130 (alloy steel), the latter being used in those portions of the framework which take the greatest load, with the total amount of steel in the fuselage approximating 80 lb. per plane; wing construction utilizes about 30 lb. of aluminum and aluminum alloys with Nicral for the ribs, aluminum compression members and aluminum leading edge; the wing struts require about 30 lb. of S.A.E. 1025; landing gear and tail surfaces utilize about 40 lb. of S.A.E. 4130; wheels with ball bearings take about 12 lb. of aluminum; front and back cowling and spinner cap use about 15 lb. of aluminum.

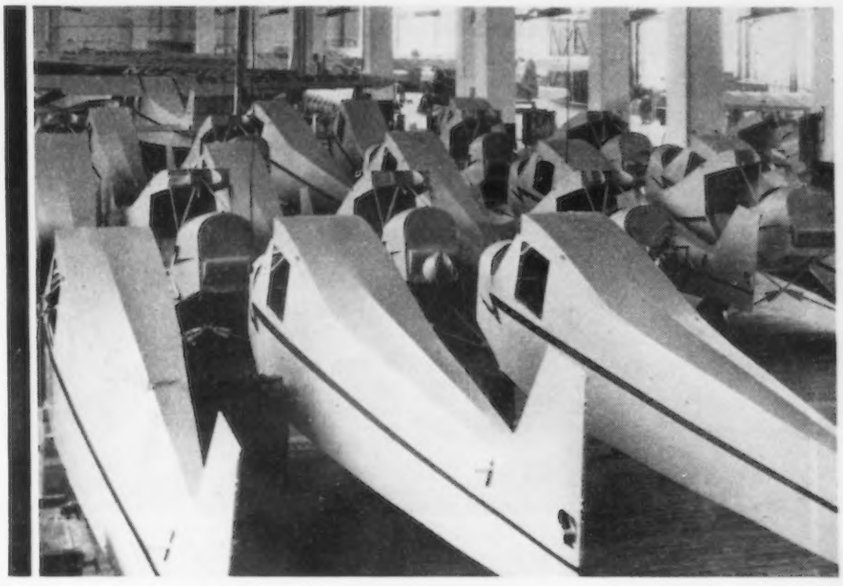
In addition to these major parts of a plane, about 30 lb. of stainless steel per plane is used in making the gasoline tank, exhaust stacks, fire wall, muffler, battery boses, and small miscellaneous parts.

Miscellaneous parts utilize about 40 lb. of flat S.A.E. 1025 stock, about 100 ft. or 3 lb. of flexible control wire, and about 5 lb. of aluminum rivets. Including the engine, which is high-grade steel construction and which weighs about 175 lb., total steel requirements on an average light aircraft amount to about 400 lb. while total aluminum parts weigh approximately 62 lb.

"The lighter aircraft is the average individual's approach to aviation and will continue to be the mainstay for private aviation whether the country is preparing or not," W. T. Piper, president of the Piper company, told THE IRON AGE.

Mr. Piper said that production at his plant for the years 1931, 1932 and 1933 totaled 70 planes for that three-year period, 70 in 1934, 210 in 1935, 550 in 1936, 700 in 1937, 730 in 1938, 1800 in 1939, and the possibility of close to 3000 or more before the end of this year.

Light aircraft is the freshman phase of air power and is the basis on which the future air defense of the country will rest. This is no idle dream when it is realized that Piper Aircraft alone has an unfilled backlog today of approximately 1400 planes and although a good portion of the recent business has been engendered by the CAA program, there has likewise been a similar pick-up and growth in demand from individuals.



THESE PLANES soon will be putt-putting around some of the 500 private airports where 40,000 to 50,000 students are to be trained for civil pilot licenses under the CAA's program.

Coming Meetings

July 22 and 23—Institute of Scrap Iron and Steel, mid-year meeting, Buffalo.

Sept. 3 to 6—American Society of Mechanical Engineers, fall meeting, Spokane, Wash.

Sept. 24 to 27—Association of Iron and Steel Engineers meeting and exhibition, Chicago.

Oct. 21 to 25—National Metal Congress, Cleveland.

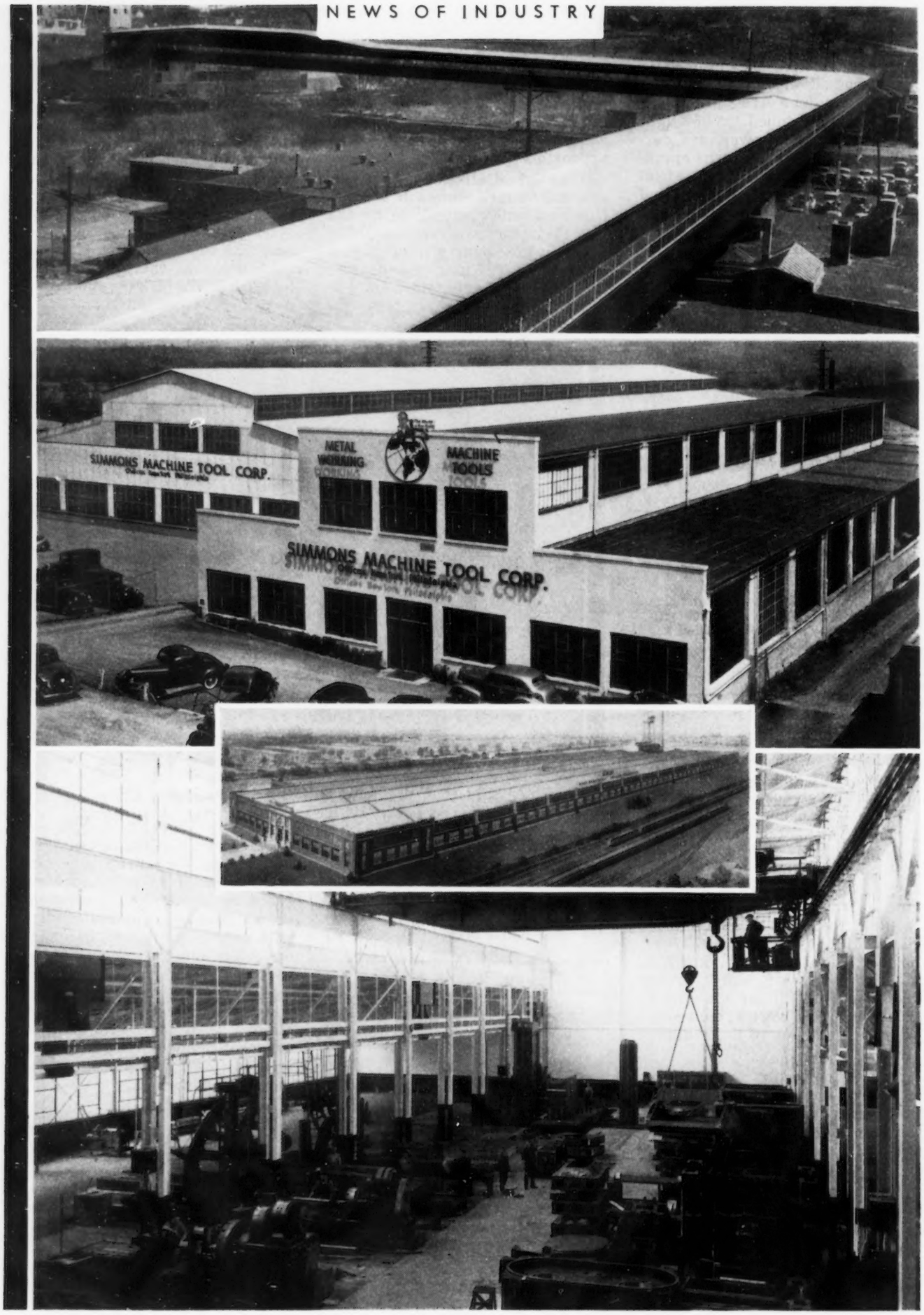
Oct. 31 to Nov. 2—Society of Automotive Engineers, national aircraft production meeting and exhibition, Los Angeles.

Russian Industry Lifts Working Week to 48 hr.

• • • **Workers in the** Soviet Union have been placed on a six-day work week of 48 hr. in order to speed the Soviet's armament program. Employees in Soviet plants will not be permitted to change one job to another without the consent of the government, according to newspaper dispatches. The All-Union Central Council of Trade Unions at Moscow said that war preparations by capitalistic countries is forcing Russia to produce more war materials.

Air Reduction Completes New Acetylene Plant

• • • **Air Reduction Co.** has just completed a new acetylene plant at West Berkeley, Cal. The plant is a short distance from the site of the old plant, and will include all modern equipment.


SIMMONS MACHINE TOOL CORP.
METAL WORKING
MACHINE TOOLS
SIMMONS MACHINE TOOL CORP.

NEW YORK LARGEST SCRAP EXPORT PORT; GALVESTON SECOND

• • • **Chief port for** the export of iron and steel scrap in 1939 was New York, which accounted for close to a quarter of all export shipments in that year, according to a survey completed by Metals and Minerals Division, Department of Commerce. Galveston, Tex., was the second largest point of origin, followed, in the order named, by Philadelphia, Massachusetts and Los Angeles.

Customs districts on the Atlantic Coast accounted for 58 per cent of all export shipments in the past year, while 22 per cent was shipped from Gulf points and 15 per cent from Pacific Coast districts. Shipments from areas bordering on Canada represented 5 per cent of the total.

About half the shipments to Japan, the largest scrap buyer in 1939, were made from Atlantic ports and 25 per cent each from Gulf and Pacific ports. Over 70 per cent of the English shipments were loaded at Atlantic ports and about 28 per cent at Gulf docks. Close to 80 per cent of the Italian shipments originated at Atlantic ports and 20 per cent at Gulf points. In the accompanying tabulation, minor customs districts and countries taking only small tonnages are not shown, but are included in total shipment columns.

The total of scrap exports to the United Kingdom last year was 508,293 gross tons, to Japan 2,024,264 tons, to Italy 425,896 tons, and to Canada 175,368 tons. Total shipments from the United States to all countries in 1939 was 3,551,539 gross tons, according to the Department of Commerce. The 1939 exports of scrap iron and steel by customs districts are shown in the table opposite.

(Gross Tons)

From Customs District to East Coast Ports → ↓	United Kingdom	Japan	Italy	Canada	Total All countries
Maine-New Hampshire	39,131	18,312	4,798	4,043	72,156
Vermont	1,965	.....	.....	4,900	6,865
Massachusetts	74,304	53,822	67,429	.....	212,555
Rhode Island	16,668	31,041	5,725	.....	70,678
Connecticut	5,995	.....	2,712	.....	16,644
New York	**97,161**	**542,661**	**66,811**	.....	**847,353**
Philadelphia	**19,548**	**112,339**	**54,796**	.....	**241,798**
Maryland	27,225	50,849	40,226	.....	168,282
Virginia	9,671	87,007	32,050	.....	136,814
N. Carolina	9,680	15,021	20,242	.....	61,514
S. Carolina	6,050	8,709	8,605	.....	23,792
Georgia	34,052	43,922	16,484	.....	105,108
Florida	23,262	47,350	16,716	.....	106,171
Gulf Ports					
Mobile	19,231	32,871	8,680	.....	66,882
New Orleans	26,439	111,277	32,454	.....	185,756
Sabine	24,450	59,659	8,979	.....	94,051
Galveston	**63,592**	**256,301**	**37,183**	**2,811**	**372,756**
San Antonio	5,564	13,557	1,995	.....	42,212
West Coast Ports					
San Diego	.....	5,514	.....	.....	5,515
Los Angeles	.....	193,819	11	522	197,387
San Francisco	.....	58,711	.....	.....	59,044
Oregon	.....	160,414	.....	.....	160,756
Washington	.....	117,447	.....	1,814	119,390
Others					
Duluth-Superior	.....	.....	.....	62,219	62,219
Michigan	.....	.....	.....	86,736	86,856
Chicago	.....	.....	.....	4,459	4,461
Buffalo	.....	.....	.....	4,766	.....
St. Lawrence	.....	.....	.....	2,894	.....
Total, all Districts	508,293	2,024,264	425,896	175,368	3,551,539

Source: Metals and Minerals Division, Department of Commerce.

A.S.T.E. Plans Fall Meeting at Cincinnati

• • • **Tooling with men and machines** for national defense will be the keynote of the semi-annual convention of the American Society of Tool Engineers, scheduled for Cincinnati, Oct. 17 to 19, according to an announcement by Ford R. Lamb, executive secretary. The three day session is to be attended by tool engineers from all mass production industries.

The program includes both technical sessions and inspection trips to machine tool and production plants in the Cincinnati area. The sessions will include a symposium on the subject of "Should Industry Assume the Burden of Special Education." The subject is regarded as of immediate vital importance due to the shortage of trained tool engineers and designers in industry.

Aeronautical preparedness will be the subject of the dinner meeting on the 18, while technical programs will include a symposium on gear production methods.

INDUSTRY BUILDS TO meet accelerated demands of war and peace. At the top of the opposite page is a new 1000-ft. industrial bridge at Westinghouse Electric & Mfg. Co.'s Mansfield, Ohio plant; it houses three lines of conveyors. Second from the top is the Simmons Machine Tool Corp.'s new 60,000 sq. ft. addition at Albany, N. Y., while the inset photograph shows SKF's No. 2 plant, one of the most modern in Philadelphia. The lower photo shows part of the 34,000 sq. ft. addition to Cleveland Punch & Shear Works Co.'s plant at Cleveland.

Italy Gets Vanadium From Smoke Stacks

Washington

• • • **The Commerce Department** reports say that Italy's supply of vanadium for steel alloys is being augmented by collecting naphtha soot from smokestacks of ships and industrial plants with about 50 gross tons of vanadium-bearing concentrates being produced annually. A private company launched the enterprise, according to the report, but the government took over after the company met financial reverses.

At the same time, other reports showed that Italy is almost entirely dependent on foreign sources for copper. It was estimated that Italy's domestic production of copper cannot exceed 6000 tons annually, a figure which is reported to represent about 6 per cent of normal Italian consumption.

Defense Program Lifts Government Orders to a New High

Washington

• • • **Federal contracts** for iron and steel products, as reported for the week ended June 22 by the Labor Department's Public Contracts Division, totaled $3,391,821. For the same period contracts for non-ferrous metals and alloys aggregated $167,456; and for machinery, $203,452. Details follow:

Iron and Steel Products

Joseph T. Ryerson & Son, Inc., Chicago, steel tubing, $10,066; Commercial Iron Works, Portland, Ore, service gates, $59,750; United States Machine Corp., Lebanon, Ind., machined shell, $35,155; The Mosler Safe Co., Hamilton, Ohio, safes, $16,949; Herring-Hall-Marvin Safe Co., Hamilton, Ohio, safes, $42,750; Diebold Safe & Lock Co., Washington, D. C., safes, $13,781; York Safe & Lock Co., York, Pa., safes, $44,070; The Globe Wernicke Co., Cincinnati, safes, $14,500; The Shelt Co., Elmira, N. Y., iron pipe, $23,885; The Variety Aircraft Corp., Dayton, Ohio, ladder assemblies, $9,-373; Chevrolet Motor Division, General Motors Corp., Detroit, machined shell, $100,850; Federal Screw Works, Detroit, detonator sockets, $36,870; Reeves Steel & Mfg. Co., Dover, Ohio, buckets, $20,937; Noland Co., Inc., Washington, D. C., plumbing supplies, $26,845; American Cast Iron Pipe Co., Birmingham, Ala., cast iron pipe, $24,-332; Bethlehem Steel Co., San Francisco, reinforcement bars, $54,030; Consolidated Steel Corp., Ltd., Los Angeles, gate hoists, $82,000; Cuno Engineering Corp., Meriden, Conn., gasoline filters, $15,936; American Emblem Co., Inc., Utica, N. Y., badges, $14,471; Emsco Derrick & Equipment Co., Houston, Tex., steel towers, $27,-517; The Maryland Culvert & Pipe Co., Baltimore, corrugated pipe, $27,-389; General Iron Works Co., Denver, machined shell, $115,455; Campbell, Wyant & Cannon Foundry Co., Muskegon Heights, Mich., steel castings, $98,880; National Pneumatic Co., Inc., Rahway, N. J., guns, $1,412,227; Chevrolet Motor Division, General Motors Corp., Detroit, forgings for shell, $36,-127; The Hobart Mfg. Co., Troy, Ohio, telescope mounts, $46,099; General Electric Co., Federal and Marine Dept., Schenectady, N. Y., howitzer, $552,834; The Midvale Co., Philadelphia.

Non-Ferrous Metals and Alloys

Scovill Mfg. Co., Waterbury, Conn., cartridge cups, $43,450; The American Brass Co., Waterbury, Conn., cartridge cups, $79,300; Revere Copper & Brass, Inc., Baltimore Division, Baltimore, brass tubing, $10,356; Nathan Trotter & Co., Philadelphia, copper ingots, $34,350.

Machinery

The American Laundry Machinery Co., Cincinnati, laundry machines, $19,174; The Good Roads Machinery Co. of New York, Inc., New York, rollers, $11,700; Oliver Machinery Co., Grand Rapids, Mich., sander, $12,438; M. D. Larkin Co., Dayton, Ohio, grinders & jointer, $10,544; Addressograph-Multigraph Corp., Cleveland, addressing machine, $29,175; International Harvester Co., Inc., Chicago, tractors, $10,060; The Thew Shovel Co., Lorain, Ohio, shovel, $19,760; The Browning Crane & Shovel Co., Cleveland, locomotive crane, $12,101; Ingersoll-Rand Co., Painted Post, N. Y., construction machinery, $10,720; Iowa Manufacturing Co., Cedar Rapids, Iowa, rock crushing plant, $25,475; Austin-Hastings Co., Inc., Cambridge, Mass., tool lathe, $13,130.

Labor Department's Public Contracts Division

The Labor Department's Public Contracts Division reported for the week ended June 15, a total of $1,369,342. For the same period contracts aggregated $85,112 for non-ferrous metals and alloys; and $1,261,364 for machinery. Details follow:

Iron and steel products: American Bridge Co., Denver, coaster gates, $113,128; The B. F. Goodrich Co., Akron, welded tanks, steel, $18,090; Stanley G. Flagg & Co., Inc., Philadelphia, tube fittings, $40,222; Walworth Co., New York City, tube fittings, $103,474; Wire Rope Corporation of America, Inc., New Haven, Conn., wire rope, $50,039; Armstrong Brothers Tool Co., Chicago, wrenches, $15,414; The Mosler Safe Co., Hamilton, Ohio, burglar resisting cabinets, $18,887; Elliott Co., Jeannette, Pa., feed-water heaters, $85,146; National Tube Co., Elwood City, Pa., steel tubing, $11,931; Lukens Steel Co., Coatesville, Pa., steel forgings, $55,-824; The Midvale Co., Philadelphia, forgings, $22,900; Kingston Products Corp., Kokomo, Ind., machined shells, $45,062; Darling Valve & Mfg. Co., Williamsport, Pa., machined shells, $58,902; Mergenthaler Linotype Co., Brooklyn, aiming circles, $128,953; The Plomb Tool Co., Los Angeles, miscellaneous tools, $62,898; Peter A. Petroff, Brooklyn, axle, $10,900; Schmitt Steel Co., Portland, Ore., heating and seat plate assemblies, $42,984; The Mattatuck Mfg. Co., Waterbury, Conn., primer bodies, $18,800; The Chicago Screw Co., Chicago, cartridge containers, $10,-098; Standard Pressed Steel Co., Jenkintown, Pa., bullet cores, $304,-800; Carnegie-Illinois Steel Corp., Boston and Chicago, miscellaneous steel, $12,560; Western Pipe & Steel Company of California, Los Angeles, steel pipes, $78,895; United States Steel Export Co., New York, structural steel, $13,267; Milwaukee Bridge Co., Milwaukee, bridge parts, $12,950; Reliance Steel Products Co., McKeesport, Pa., bridge parts, $16,-351; The Superior Sheet Steel Co., Park & Williams, Inc., agents, Philadelphia, terne plate, $17,662.

Nonferrous metals and alloys: Mueller Brass Co., Port Huron, Mich., brass forgings, $33,088; Phelps Dodge Copper Products Corp., New York, copper-nickel tubing, $31,301; Chase Brass & Copper Co., Inc., Waterbury, Conn., copper tubing, $20,722.

Machinery: Leslie Co., Lyndhurst, N. J., valves, $20,161; B. F. Sturtevant Co., Boston, blowers, $539,213; The Lodge & Shipley Machine Tool Co., Cincinnati, engine lathes, $41,-421; Hardie Tynes Mfg. Co., Birmingham, Ala., air compressor, $43,-420; Gisholt Machine Co., Madison, Wis., turret lathes, $17,301; Charles E. Crofoot Gear Corp., South Easton, Mass., gears and pinions, $11,738; Bay City Shovels, Inc., Bay City, Mich., crane-shovel, $10,200; The American Tool Works Co., Cincinnati, lathes, $123,873; King Machine & Mfg. Co., Los Angeles, tube valves, $12,493; Atwood & Morrill Co., Salem, Mass., pressure valves, $14,956; Link-Belt Speeder Corp., Chicago, cranes, $34,360; Ginsberg Machine Co., Inc., New York, sewing machines, $11,929; The National Acme Co., Cleveland, screw machine, $19,757; E. W. Bliss Co., Brooklyn, N. Y., heading press, $61,250; American Hoist & Derrick Co., St. Paul, derricks, $32,859; The Austin Western Railroad Machinery Co., Aurora, Ill., road sweeper, $16,479; Cyclops Iron Works, San Francisco, crane, $52,-580; Bucyrus-Erie Co., South Milwaukee, shovels, $18,092; American Hoist & Derrick Co., St. Paul, Minn., gantry

THE DOVE TATTOOED on the left arm of this Canadian workman evidently is not a dove of peace. The photograph, passed by the Canadian censor, shows the workman testing the threads in the nose of a shell.

frames, $25,092; Worthington, Pump & Machinery Corp., Harrison, N. J. pumps, $49,986; Bay City Shovels, Inc., Bay City, Mich., shovels, $104,200.

Contracts have been awarded by the Bureau of Supplies and Accounts, Navy Department, to the Aviation Mfg. Corp., Lycoming division, Williamsport, Pa., for aircraft engines at $1,541,448; the Continental Motors Corp., Muskegon, Mich., for aircraft engines at $1,442,275 and the Stearman Aircraft, Division of Boeing Airplane Co., Wichita, Kan., for airplanes and spare parts at $3,779,628.

Army Purchases

• • • **The War Department** has announced awards to the following companies:

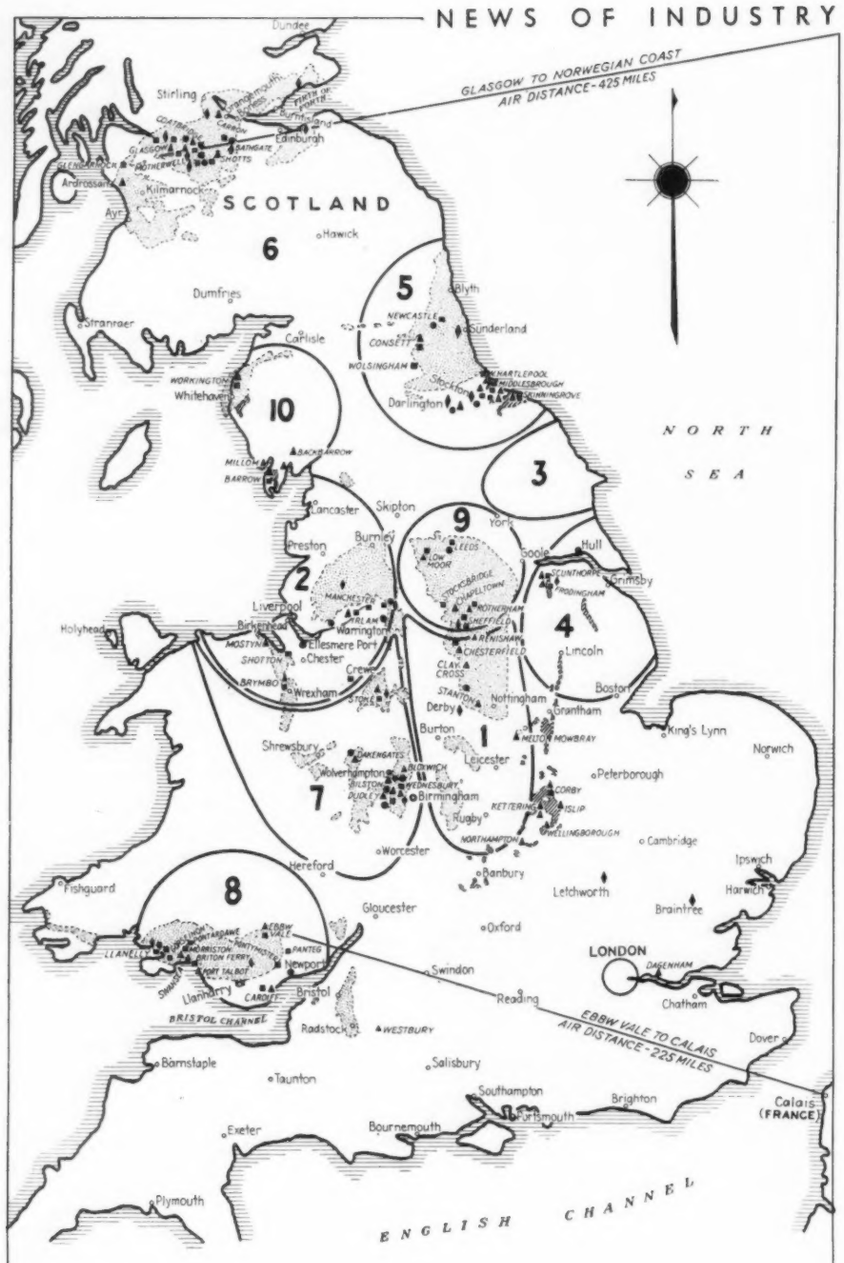
Lite Mfg. Co., New York, target assemblies, $276,328; Wright Aeronautical Corp., Paterson, N.J., maintenance parts for Wright Aeronautical engines, $258,320; United Aircraft Corp., East Hartford, Conn., propeller assemblies and controls, $238,280; United Aircraft Corp., Hamilton Standard Propellers Division, East Hartford, propeller assemblies and sets of controls, $31,500.

General Electric Co., Schenectady, N. Y., supercharger assemblies, $522,816; Bendix Aviation Corp., Eclipse Machine Division, Elmira Heights, N. Y., ammunition, $73,416; Revere Copper & Brass Co., Baltimore Division, Baltimore, ammunition parts, $4,520; National Tube Co., Pittsburgh, ammunition parts, $42,657; E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., explosives, $113,863; Federal Screw Works, Detroit, ammunition parts, $36,870.

Minneapolis-Honeywell Regulator Co., Minneapolis, assembly mounts, $7,003; Gilbert & Barker Mfg. Co., Springfield, Mass., drive mechanisms for guns, $129,506; American Hollow Boring Co., Erie, Pa., forged and rough machined, recuperator plungers for railway mounts and barbette carriages, $2,845; American Locomotive Co., Schnectady, N. Y., hollow forgings for recuperator cylinders, for railway mounts and barbette carriages, $1,005; Crucible Steel Co. of America, New York, forgings, rails, for gun, $4,824.

Leland-Gifford Co., Worcester, Mass., single-spindle vertical drill presses, $2,510; Pratt & Whitney Division, Niles-Bement-Pond Co., West Hartford, Conn., precision bench speed drive variable lathes, $2,130; Onsrud Machine Works, Inc., Chicago, vertical spindle high speed router, $1,469; Hevi-Duty Electric Co., Milwaukee, electric furnaces, $3,818; National Broach & Machine Co., Detroit, automatic profiling machines, $24,960; Austin Hastings Co., Cambridge, Mass., hydraulic type surface grinder, $21,825.

Steacy-Schmidt Mfg. Co., York, Pa., assembling and crimping machines, $12,150; Maritime Electric Co., Inc., New York, searchlight carbons, $15,978; and Whitcomb Locomotive Co., Rochelle, Ill., 20-ton locomotive, $8,920.



Distribution of British Iron and Steel Capacity

District	1	2	3	4	5	6	7	8	9	10
Per Cent of Ingot Capacity		12		9	22	15	5	21	13	3
Per Cent of Blast Furnace Capacity	21	7		13	27	5	6	11	*	10

* Included in total for districts 2 and 3

(Based on a map prepared for the American Iron and Steel Institute)

Nazis Can Reach British Plants Within 90 Min.

• • • **A large part of the** British iron and steel industry, now straining itself to the utmost to accommodate the gigantic requirements of a modern mechanized war machine, lies within 1½ hr. fiying time from German air fields in France and Holland, as the accompanying map shows. This proximity, however, is mitigated to some degree by fact that the British ferrous industry, is self sufficient to an extent not enjoyed by other European countries and consequently is not dependent upon a heavy merchant marine movement to support its operations.

Small, widely distributed plants make up the largest part of English producing capacity, although in recent years there has been a tendency toward large, completely integrated continuous mills. Typical of this trend are the plants of Richard Thomas & Co. at Ebbw Vale and the Shotten unit of United Steel Co. Finished steel capacity of each of these mills is about 600,000 tons per year. Another fairly large integrated plant is located at Irlam. Sheffield is the heart of the high quality steel industry and also the location of numerous armament works. Birmingham is another important steel center.

Domestic ore production in recent years has accounted for about 65 per cent of total consumption, the balance representing imports of high grade material from Sweden, Spain, North Africa. British ore is generally very lean in iron content, mostly under 30 per cent and imports of high grade ore by seacoast plants are economically advantageous although in an emergency domestic supplies could be utilized exclusively. Over 85 per cent of current ore output is from area made up of Districts 1, 3, 4 and 5 on map.

Large coal resources, including important beds of coking grades, eliminate the fuel problem.

Only important scarcity is manganese ore. Some local sources exist but smallness and poor

quality make it necessary to import practically all manganese ore consumed. British India is chief supplier of this material.

Scrap supplies have been short in recent years and large importations have resulted.

Up to 1889, Britain was the world's largest producer of iron and steel. In that year output of the rapidly growing industry in the United States surpassed British production for first time. Today the output of Russia and Germany also exceed Britain's. Britain's annual effective capacity is currently about 14,500,000 tons of ingots and 10,250,000 tons of pig iron.

Blast Furnace May Be Built In Texas to Use Mexican Ore

• • • **Harry Wright,** president of La Consolidada, A. S. A. (Consolidated Steel Co. of Mexico), gave out a statement to the press at Eagle Pass, Tex., that construction of a blast furnace is contemplated at that point to smelt iron ore to be brought from the Durango mines of Mexico. An investment of $5,000,000 is contemplated, it was stated. Final arrangements for the project were said to be nearing completion, the enterprise to be a part of the rearmament programs of the United States and Mexico.

New Outlay for Army Equipment May Run as High as 5 Billions

Washington

• • • **New appropriations to equip** the Army were definitely in the offing this week and some reports placed the amount to be asked by President Roosevelt as high as $5,000,000,000. Mr. Roosevelt declined to mention any specific sum but confirmed the reports to the extent of indicating that defense planning had now reached the stage where manufacturers should be provided with a backlog of orders on which to gear production.

Sources close to the War Department mentioned $3,000,000,000 as a likely figure to cover needed equipment and there seemed to be little doubt that appropriations over and above those already approved would go to the Army. In addition to providing a backlog of orders for manufacturers, the plan was referred to by the President as necessary to reduce the cost to the Government of planes, tanks and mechanized equipment.

When new facilities are created for the emergency production of armaments, Mr. Roosevelt said, it is cheaper in the long run to give sufficiently large orders so that plants may be kept going—at least for a while. That is being done at the present time, he said, adding that the idea is that much money will be saved by giving industry large orders to lessen risks on the planning and of production, and assure against large losses in experimentation.

It was explained that in the case of aircraft, application of the idea would mean placing orders for considerably more than present appropriations provide. In carrying out plans for the Administration's objective of 50,000 planes a year, that goal may not be reached, it was emphasized, but there is no reason why it should not be sought by placing orders for more than there is money to pay for at this time.

Whether this proposal was put forward by the National Defense Advisory Commission was not made clear. Members of the advisory body called at the White House last Thursday and Mr. Roosevelt told his press conference the next day that the commission was making good progress. All its members are satisfied with the cooperation they are receiving from industry, Mr. Roosevelt said.

War Boosts U. S.—Latin American Trade 54%

• • • **Elimination of virtually** all the important exporting nations of Europe from Latin American trade owing to the war increased United States exports to the South American republics 54 per cent in the first six months of the war, according to data prepared by Department of Commerce and published herewith. For further details of Latin American trade see page 62, THE IRON AGE, June 27. 1940.

Our Exports to Southern Republics—Six Months Ended March 1, 1940

	1938	1939	1940
Argentina	$53,088,000	$33,709,000	$51,744,000
Brazil	38,973,000	32,210,000	54,917,000
Venezuela	26,306,000	23,152,000	37,214,000
Colombia	19,030,000	22,419,000	28,484,000
Chile	13,180,000	11,133,000	18,898,000
Peru	10,731,000	7,726,000	12,343,000
Uruguay	7,124,000	1,731,000	4,575,000
Ecuador	2,552,000	1,697,000	4,028,000
Bolivia	3,652,000	2,377,000	2,737,000
Paraguay	408,000	363,000	468,000
Mexico	50,744,000	31,510,000	48,555,000
Cuba	47,344,000	37,933,000	49,867,000
Panama[1]	12,048,000	12,133,000	24,111,000
Costa Rica	2,288,000	3,305,000	6,021,000
Guatemala	3,611,000	3,717,000	5,190,000
Dominican Rep.	3,326,000	2,992,000	3,742,000
Honduras	3,044,000	3,010,000	3,331,000
Haiti	1,922,000	2,157,000	2,868,000
Salvador	1,945,000	1,865,000	2,619,000
Nicaragua	1,725,000	1,826,000	2,550,000
Total	$303,042,000	$236,967,000	$364,261,000

[1] Includes Canal Zone.

Canada Places War Contracts Of $20,295,539

Ottawa

During the past week Department of Munitions and Supply reported the placing of 1613 contracts of total value of $20,295,539. Included in those receiving contracts were five United States companies, whose orders had a value in excess of $170,000. Following are the more important of the awards reported during the week:

Mechanical transport: General Motors Products of Canada, Ltd., Oshawa, $58,433; W. D. Beath & Son, Ltd., Toronto, $80,080; Gotfredson Limited, Walkerville, $98,978; Ford Motor Co. of Canada, Ltd., Windsor, $36,598; Canadian Car & Foundry Co., Ltd., Montreal, $42,120; Dominion Rubber Co., Ltd., Montreal, $21,715; Eastern Steel Products, Ltd., Montreal, $25,200; George W. Reed & Co., Ltd., Montreal, $138,858; the Metallic Roofing Co. of Canada, Ltd., Ottawa, $11,787; La France Fire Engine & Foamite, Ltd., Toronto, $154,336; Seiberling Rubber Co. of Canada, Ltd., Toronto, $15,050; Firestone Tire & Rubber Co. of Canada, Ltd., Hamilton, $18,318; Dominion Truck Equipment Co., Ltd., Kitchener, $10,200; Truck Engineering, Ltd., Woodstock, $25,500; Gar Wood Industries, Ltd., Windsor, $158,670; Kelsey Wheel Co., Ltd., Windsor, $248,937; Western Steel Products Corp., Ltd., Winnipeg, Man., $62,125; Martin Perry Corp., West York, Pa., U. S. A., $79,447; Massey-Harris Co., Ltd., Toronto, $75,150; Sawyer Massey Co., Ltd., Hamilton, $8,740; Canadian Top & Body Corp., Ltd., Tilbury, $8,505.

Aircraft Supplies: British Air Ministry, $156,359; Canadian Pratt & Whitney Aircraft Co., Ltd., Longueuil, $72,865; British Aeroplane Engines, Ltd., Montreal, $349,932; Aviation Electric Co., Ltd., Montreal, $125,521; Noorduyn Aviation, Ltd., Montreal, $1,261,625; International Paints of Canada, Ltd., Montreal, $10,782; Ottawa Electric Service Co., Ltd., Ottawa, $18,619; The De Haviland Aircraft of Canada, Ltd., Toronto, $163,366; Fairchild Aircraft, Ltd., Longueuil, Que., $40,000; Canadian Wright, Ltd., Montreal, $5,524; B. J. Coghlin Co., Ltd., Montreal, $9,288; Irvin Air Chute Ltd., Ottawa, $73,093; The Ontario Hughes-Owens Co., Ltd., Ottawa, $10,077; Ottawa Car & Aircraft Co., Ltd., Ottawa, $17,483; Boeing Aircraft of Canada, Ltd., Vancouver, B. C., $11,567.

Electrical Equipment: Canadian Marconi Co., Ltd., Montreal, $392,215; Northern Electric Co., Ltd., Ottawa, $16,019; Exide Batteries of Canada, Ltd., Toronto, $21,452; Canadian Westinghouse Co., Ltd., Ottawa, $7,110; W. D. Beath & Son, Ltd., Toronto, $32,623; Gotfredson Limited, Walkerville, $9,659.

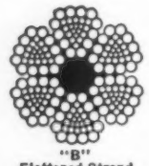
Shipbuilding: Clarke Steamship Co., Ltd., Montreal, $606,739; Dufferin Shipbuilding Co., Ltd., Toronto, $2,453,760; R. M. Betts, Halifax, N. S., $46,000; W. C. McKay & Son, Ltd., Shelbourne, N. S., $7,452; St. John Dry Dock & Shipbuilding Co., Ltd., St. John, N. B., $11,500; Burrard Dry Dock Co., Ltd., North Vancouver, B. C., $4,017,600; North Van Ship Repairs, Ltd., North Vancouver, B. C., $4,017,600.

Machinery, Tols: Rudel Machinery Co., Ltd., Montreal, $11,205; United Steel Corp., Ltd., Montreal, $42,087; Williams & Wilson, Ltd., Montreal, $12,451; Canadian Fairbanks-Morse Co., Ltd., Ottawa, $17,299; Stephens-Adamson Mfg. Co. of Canada, Ltd., Belleville, $136,080; Kelsey-Wheel Co., Ltd., Windsor, $8,198; Lufkin Rule Co. of Canada, Ltd., Windsor, $15,677.

Munitions: Beatty Brothers, Ltd., Fergus, Ont., $9,250.

Ordnance: Auto Ordnance Corp., New York, $53,272; Saginaw Stamping & Tool Co., Saginaw, Mich., U. S. A., $8,483; Air Ministry, England, $499,500; Pressure Castings of Canada, Ltd., Weston, $48,325.

Style B Flattened Strand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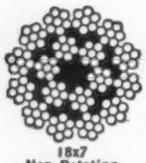
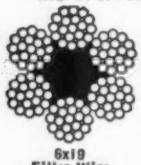
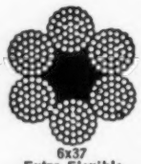

18x7 Non-Rotating


6x19 Filler Wire

6x19 Seale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8x19 Extra Flexible

GM of Canada Throws Full Effort to War Work

Toronto

Harry J. Carmichael, vice-president, General Motors Corp. of Canada, Ltd., stated that three factories of the corporation have thrown their full weight into Canada's war effort. He stated that General Motors last week appropriated an additional $1,297,000 for factory rearrangement, which will bring the total expenditure since last February to $3,000,000. The plants involved are at Oshawa, St. Catharines and Windsor, in Ontario. Mr. Carmichael stated that General Motors is at work on enough military trucks to carry the whole Canadian army.

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WHERE OTHER WASHERS HAVE BEEN TRIED NOW EVERLOCKS ARE SPECIFIED

Defense Buying To Be Coordinated By Appointment of Donald M. Nelson

Washington

• • • **A move in the direction** of greater centralization of defense purchasing authority was made by the White House last week when Donald M. Nelson, newly-appointed director of the Treasury Department's Procurement Division, was designated as purchasing coordinator under the National Defense Advisory Commission. While the development was interpreted as tending to broaden the commission's authority, the announced plans called for retention of the War and Navy Department's buying power subject only to such coordination as may be found necessary to establish priorities.

President Roosevelt named Mr. Nelson, former president of Sears-Roebuck & Co., and administrator adviser in various capacities since the days of NRA, after a report had been made by a four-man committee designated to study the question of centralizing government defense purchasing. The committee members included Edward R. Stettinius, Jr., member of the defense advisory commission in charge of raw materials; Rear Admiral Ray Spear of the Navy Department; Brig. Gen. C. T. Harris, assistant chief of ordnance, War Department, and Mr. Nelson.

The committee recommended (1) coordination of purchases to avoid competition between federal agencies and competition for the output of the same manufacturing facilities; (2) compilation of present and future material requirements of all federal agencies; (3) aid in the application of priorities when requirements exceed resources; (4) assignment of purchase function to the agency best qualified to perform; (5) and the elimination of delays in purchasing through the enactment of corrective legislation.

If Mr. Roosevelt accepts the recommendations made by the committee, Mr. Nelson's duties will include:

1. Determination of the most economical and effective methods of purchase of repetitive items common to several agencies and assignment of the purchase function to the agency or agencies best qualified to perform it, provided that the War and Navy Departments shall have authority for making purchases necessary for the national defense, subject to such coordination as may be required to establish priorities.

2. Collection, compilation and keeping current statistics on purchases made by any federal agency.

3. Coordination of research in procurement specifications and standardization now conducted by the different federal agencies.

4. Determination and keeping current the combined immediate material requirements of all federal agencies, and estimating of future requirements to facilitate purchases and cushion the impact of such orders on the national economy.

5. Reviewing existing laws and recommending to the President such new legislation and simplification of existing legislation as may be necessary to make government purchasing more efficient and effective.

6. Investigating the necessity for making recommendations to the President relative to granting priority to orders for material essential to the national defense over deliveries for private account or for export.

That the advisory commission or some similar agency will eventually take all government purchasing under its wing is expected if and when this country goes on a war footing. Such centralizing purchasing authority was vested in the powerful War Industries Board during the World War days.

The plan to centralize government purchasing is not a new one to the New Deal. Soon after it took office, the administration conceived the idea of establishing the Procurement Division whose job was to do all non-military buying for the government. While the division attained a fair degree of success there were certain departments which for various reasons continued to do their own buying. Hence, while the objective was to attain greater centralization, actually the procurement division was until recently engaged in the process of de-centralizing much of the govenment's non-military purchasing.

Here Are Names of Army Buyers for Michigan

Detroit

• • • **The following officials** are in charge of field procurement offices of the War Department for the area which includes Michigan:

Quartermaster Corps (motor procurement), Capt. Clarence E. Jones, 611 Federal Bldg., Detroit; Ordnance Department, Maj. Richard Z. Crane, 1832 National Bank Bldg., Detroit; Air Corps, Lieut.-Col. P. S. Schneeberger, Wright Field, Dayton, Ohio; Engineer Corps, Maj. R. Whitaker, 1117 U. S. Post Office Bldg., Chicago; Medical Department, Lieut.-Col. E. R. Strong, 1203 Post Office Bldg., Chicago; Signal Corps, Capt. Arthur E. Mickelson, 1819 W. Pershing Road, Chicago; Chemical Warfare Service, Maj. Harry R. Lebkicher, 1113 Post Office Bldg., Chicago.

The mailing of requests for bids for the Navy is from the Supply Officer, Naval Training Station, Great Lakes, Ill.

Gray Iron Company to Be Organized in Ohio

Tiffin, Ohio

• • • **A site for a foundry** has been purchased in Tiffin by Andrew Heilman, Cleveland, Naylor B. Biggs, secretary of the Tiffin Chamber of Commerce, reports. Mr. Heilman will incorporate under the name of the Tiffin Gray Iron & Semi-Steel Co., and expects to be in operation with 35 molders in six weeks. He was formerly connected with the Meech Avenue Foundry Co.

A MESSAGE IN THE INTEREST OF NATIONAL DEFENSE

★ ★ ★ ★ ★

Europe's battlefields provide an object lesson in modern methods of *waging* war. Equally, foreign methods of *producing* the *implements* of war are of vital interest to American manufacturers involved in National Defense.

Plants abroad know that American machine tools are the finest in the world . . . have imported and copied them. But, when it comes to the *modern cutting tools* that *determine the productive out-put* of such machines, Europe has *advanced far beyond* us in the acceptance and use of Sintered Carbides and Super High Speed Steels. While larger belligerents have been using *tons* of Sintered Carbide for cutting tools, this country (with far more potential applications) has applied it in terms of *pounds* and *grams!*

Adequate defense demands unprecedented production—enlarged plants, new machine tools, increased personnel. Such expansion takes time. We do not have that time to spare! Production *can be* stepped up IMMEDIATELY by utilizing *truly modern cutting tools* to increase machine tool capacities. These tools are available NOW. They can be at work in a *few days* while new machines may not be available for *months!* They will *positively increase* the production of thousands of older machine tools and keep new machines operating at full rate capacities! They are readily adapted to working the hard, tough alloys used for munitions, arms and armored mechanized equipment!

The productivity of the skilled men now employed can be immediately increased while new personnel are being trained.

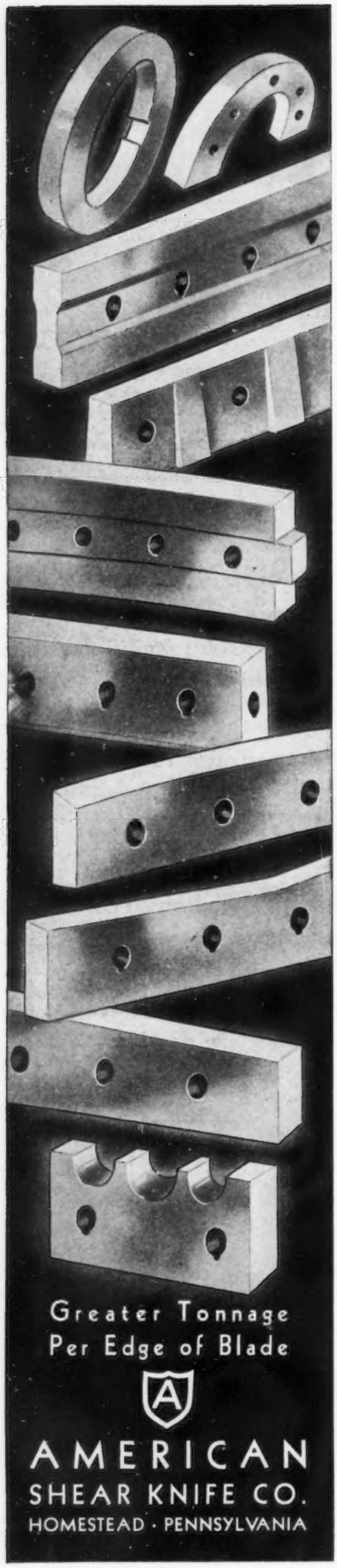
The cost of Sintered Carbide and Super High Speed Tools is somewhat higher than ordinary cutting tools, initially. The ultimate cost is *less,* in terms of *increased* production. The premium is *trivial* compared with the investment required for machine tools. Adequate defense demands increased production now!

Our Engineers Are At Your Service To Assist You In Applying The Increased Productive Capacity Of

★ **FIRTHITE SINTERED CARBIDE**
★ **FIRTHALOY SINTERED CARBIDE**
★ **CIRCLE © HIGH SPEED STEEL**

FIRTH-STERLING STEEL COMPANY

OFFICE AND WORKS:
McKEESPORT, PA.
BRANCH WAREHOUSES:
NEW YORK CHICAGO
HARTFORD PHILADELPHIA
LOS ANGELES DAYTON
CLEVELAND DETROIT



Machinery Exports During May 41% Above Like Month Last Year

Washington

• • • **The value of May** exports of industrial machinery are estimated at $36,682,663 by the Commerce Department's Machinery Division. This represents a slight decrease from last month's high level but is 41 per cent above the May, 1939, figure of $26,085,746. Exports of power-driven metal-working machinery, valued at $19,142,225, did not reach the record established last month but were nevertheless 65 per cent above the May, 1939, exports of $11,615,799, the department reported.

May, 1940, exports, by major types, compared with those of May, 1939, are as follows: Lathes, $4,038,325 in May, 1940, against $1,700,196 in May, 1939; milling machines, $2,315,698-$2,216,825; thread cutting and automatic screw machines, $1,729,593-$619,940; vertical boring mills and chucking machines, $674,470-$420,959; vertical drilling machines, $309,606-$82,511; gear cutting machines, $722,991-$280,083; surface grinders, $440,416-$219,400; external cylindrical grinders, $755,987-$410,208; sheet and plate metal-working machines, $756,652-$813,187; forging machinery, $1,261,457-$410,736, and rolling-mill machinery, $914,454-$1,209,654.

Shipments of other metal-working machinery amounted to $681,920 or 66 per cent above the corresponding 1939 figure of $409,836.

Detroit Orders Wheels Despite Federal Inquiry

Detroit

• • • **Authorization to the** Detroit Street Railway to purchase 1000 street car wheels at $22.25 each from Standard Steel division of Baldwin Locomotive Works, has been given by the Detroit Common Council despite the fact that the city has instigated a Department of Justice investigation of the equal bids submitted by Standard Steel, Edgewater Steel Co., Chicago; Armco Railroad Sales Co., Cleveland, and Bethlehem Steel Co. A fifth bid, of $23.55, was offered by National Malleable & Steel Castings Co. of Cleveland. Although the federal investigation is pending, the Street Railway Commission selected one of the bidders at random, it was said.

Joslyn Mfg. & Supply Buys Pratt Company

Chicago

• • • **The Joslyn Mfg. & Supply** Co., Chicago, has purchased all shares of the William E. Pratt Mfg. Co., Joliet, Ill. The Pratt Mfg. Co. produces malleable iron castings and roller bearings and the present management will continue operating as a subsidiary of the Joslyn company.

Canada Can Conscript All Property, Persons

Toronto

• • • **Canadian government** and industrial leaders are making new efforts to speed up and greatly expand Canada's war efforts. To give the government the necessary power to carry out its new program Parliament has approved by overwhelming majority the "Natural Resources Mobilization Act," which grants the government authority to conscript persons, resources and property and place these at the disposal of the government, if, as and when required.

Electric Furnace Shipment Takes 33 Railroad Cars

• • • **The country's largest** single shipment of electric furnaces was recently made from the East Pittsburgh Works of the Westinghouse Electric & Manufacturing Co. The furnaces, transported on 33 railroad cars, will be used for bright annealing low and high carbon steel in coils and stacked sheets. Some of the furnaces will also be used for annealing brass clad steel. Gas atmosphere which is included for all applications makes it possible to spheroidize anneal high carbon steel without decarburization. The name of the buyer was not disclosed.

MORE STRENGTH TO MEET STRESS...

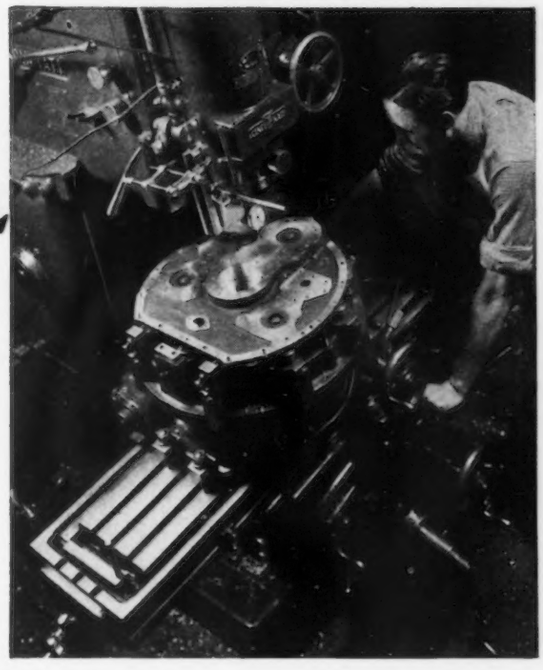
50 *places in a power shovel...*

85 *places in a rock drill...*

275 *places in a milling machine*

NICKEL ALLOY STEELS

Measured by weight, nearly ⅓ of this Bay City power shovel is fabricated from long-wearing Nickel alloy steels. 50 vital parts which must withstand fatigue strains, shock stress and overloads are made of SAE 3135 oil quenched Nickel-chromium steel and other Nickel alloy steels. Frames and bases are Nickel cast steel. "Chabelco" crawler drive chains, Diamond crowd chain, Hercules gasoline and Caterpillar Diesel engines on Bay City shovels also employ high strength Nickel alloy steels for important stressed components.



More than 275 stressed parts in this dial type Cincinnati milling machine are Nickel alloy steels. Nearly 200 of these parts are made of a Nickel-chromium steel, heat treated to high strength yet readily machinable. Parts subject to wear are case-hardened.

Here are five Gardner-Denver rock drills mounted for tunnel driving. In each drill, 85 stressed parts are produced from Nickel alloy steels. The Gardner-Denver Co. writes, "Through increased use of Nickel alloy steels, remarkable improvements in performance and reduction in maintenance costs have been accomplished—without comparable increase in weight or bulk."

• • •

➡ Purchasing and production are often simplified because the versatility of Nickel steels usually permits one Nickel steel to efficiently serve many purposes. Practical answers to your inquiries will be given promptly, based upon our broad experience with many industries. Please address:

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK, N. Y.

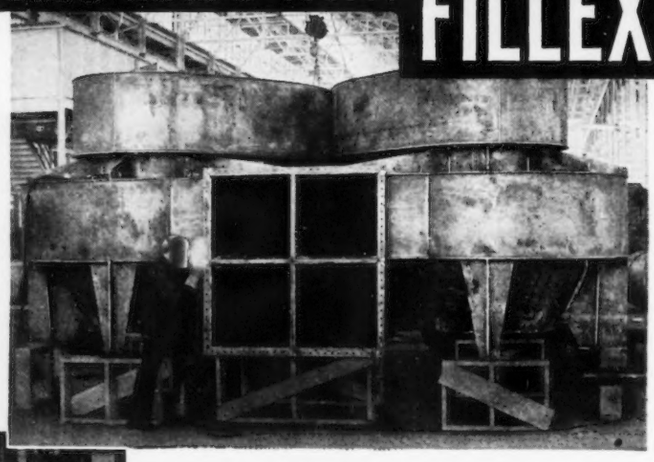
Standards Bureau Issues Low-Cost House Report

Washington

• • • **The Bureau of Standards,** working on a program of research on building materials suitable for low-cost houses in cooperation with the building industry, has completed a report covering 27 specimens of "Scot-Bilt" pre-fabricated sheet-steel wall, floor and roof constructions submitted by the Globe-Wernicke Co., Cincinnati.

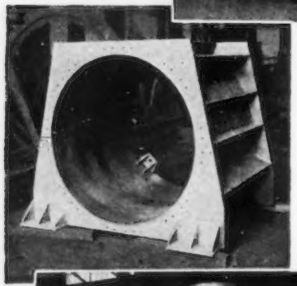
Identified as Report BMS-46, the document is one of a series issued by the bureau on the structural properties of constructions intended for low-cost houses. Copies of the reports are available at the Bureau of Standards or at the Government Printing Office in Washington.

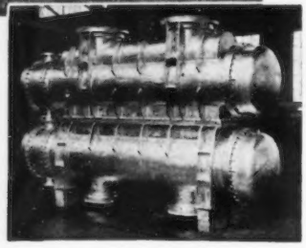
YOUR HORIZONTAL FILLETS WILL COST LESS MADE WITH FILLEX



Dust collectors Murex-welded by American Blower Co., Detroit, involve many Fillex applications.

Fillex speeds fillet welding like that in this air test assembly, Murex-welded by The Graves-Marshall Co., Dayton, Ohio.





Fillets in these Murex-welded petroleum condensers, built by Ross Heater Co., Buffalo, are typical of Fillex welds.

THE HEAVY COATED "HOT ROD" THAT PROVIDES CLEANER WELDS AT HIGHER CURRENTS

Specially designed for high speed horizontal fillet welding, Murex Fillex Electrodes help reduce welding costs.

Even at high amperages, Fillex Electrodes produce sound, evenly proportioned fillets without undercutting and with a minimum of spatter. Slag is easily removed, resulting in real savings in time on multi-pass work. Weld surfaces are smooth and welds require little or no cleaning.

Write and ask to have Fillex demonstrated on your horizontal fillet welding applications.

METAL & THERMIT CORPORATION
120 BROADWAY, NEW YORK, N. Y.
Albany • Chicago • Cincinnati • Detroit
Minneapolis • So. San Francisco • Toronto
"Murex Electrodes—Thermit Welding—Thermit Metals & Alloys."

Investigate Thermit Welding, too—in use since 1902 for heavy repair work; crankshafts, housings, frames, etc.

MUREX HEAVY COATED Electrodes
A COMPLETE LINE FOR EVERY WELDING APPLICATION

Defense Survey Made of Idle Auto Workers

Detroit

• • • **Survey of the** automobile industry "labor reservoir" being made jointly by the National Defense Commission and the CIO's United Automobile Workers union is expected to be completed by mid-July and to make available to the commission a complete file on skilled, semi-skilled and unskilled labor in this area. Unofficial estimates place the total of unemployed auto workers at about 100,000.

Tool and die workers not employed in their field will be sought through the census in an attempt to avoid a bottleneck in that branch of the business, it was predicted. Many of these workers, unemployed for several years, or now in other types of employment, have abilities which could be brought back into service by short training courses, it is believed.

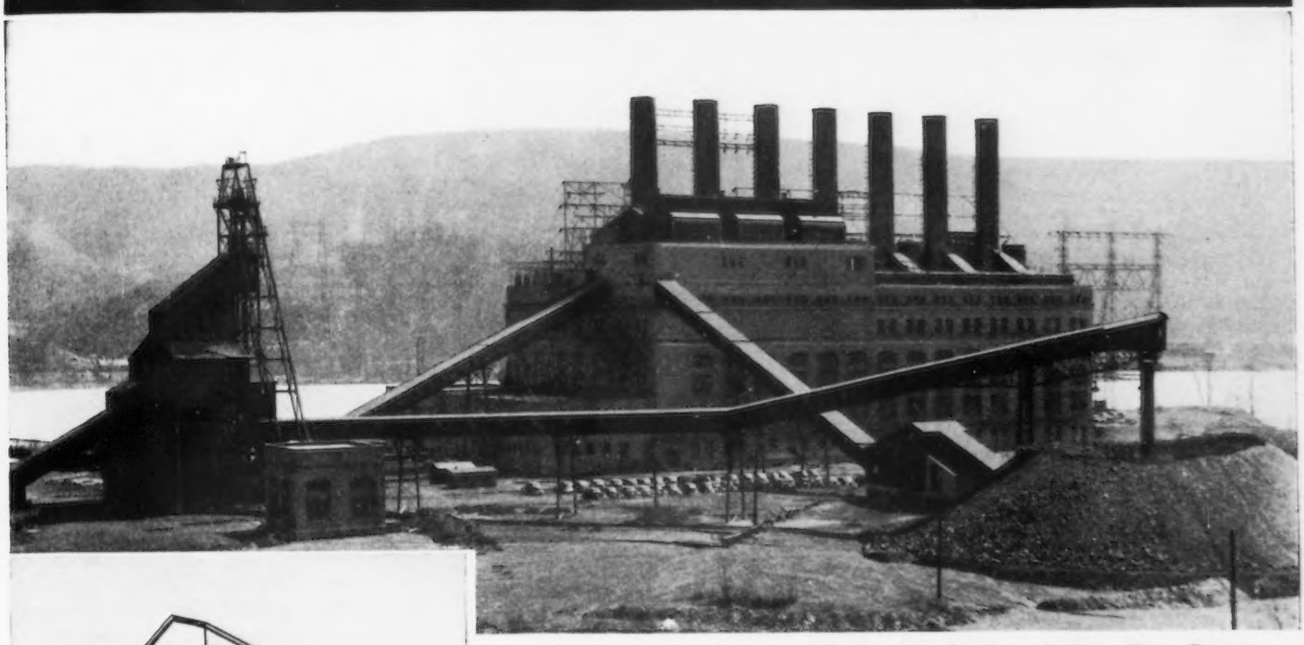
The Michigan State Employment Service reports that more than 200,000 are registered and available from its rolls. Many of these are skilled workers who might be fitted into the defense program. According to Harry A. McDonald, chairman of the Michigan Unemployment Compensation Commission, of which the service is a division, the state has a complete work history of all the applicants registered, and can make its services available for defense hiring.

Roosevelt Signs Bill for Bomb Resisting Locks

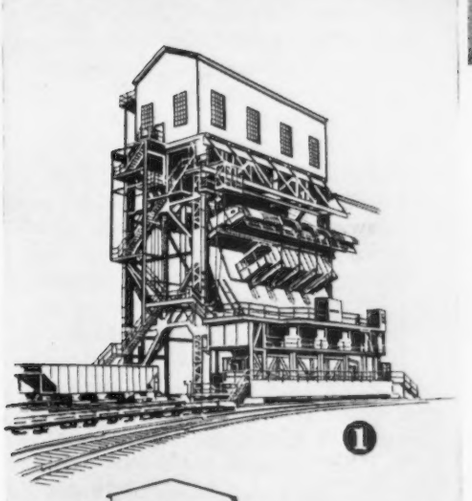
Washington

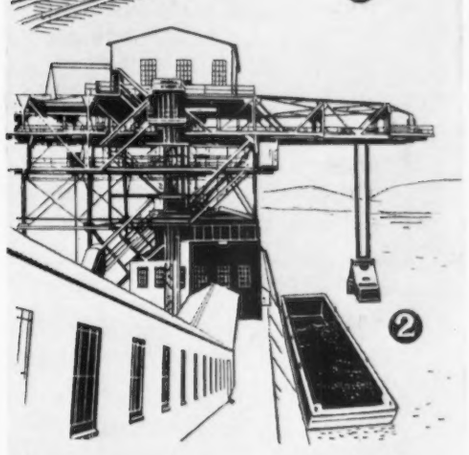
• • • **President Roosevelt** has signed the War Department Civil Functions bill carrying appropriations of almost $223,000,000 of which $15,000,000 will be used to start work on a third set of bomb-proof Panama Canal locks. Authorizations for these locks aggregate $99,000,000. The act also authorizes a contract prior to July 1, 1941, of $4,500,000 for construction of special protective works for the canal, for which an appropriation of $19,000,000 was made. The bill provides $67,365.31 for maintenance and improvement of river and harbor projects and $70,000,000 for general flood projects.

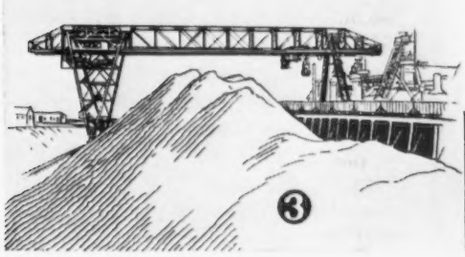
MATERIALS HANDLING



Coal Handling System *at Springdale Station of West Penn Power Company, designed, fabricated and erected by Heyl & Patterson.*







Designed FOR YOUR SPECIFIC JOB

At this 210,000-kilowatt mine-mouth station of West Penn Power Company the problem was to convey coal from the mine tipple to the station bunkers. From the inception of this project, Heyl & Patterson has collaborated with the utility's engineers in the development of this coal handling system and has supplied practically all of the structures and equipment.

Similarly Heyl & Patterson is working with the engineers of the iron and steel industry. Shown at the left are three outstanding rigs, typical of the equipment designed, fabricated and erected by this organization:

(1) **CAR DUMPER,** *capable of handling 120-ton loaded ore cars, at a steel plant.*

(2) **UNLOADING TOWER,** *removing 850 tons of coal per hour from river barge, at a by-product coke plant.*

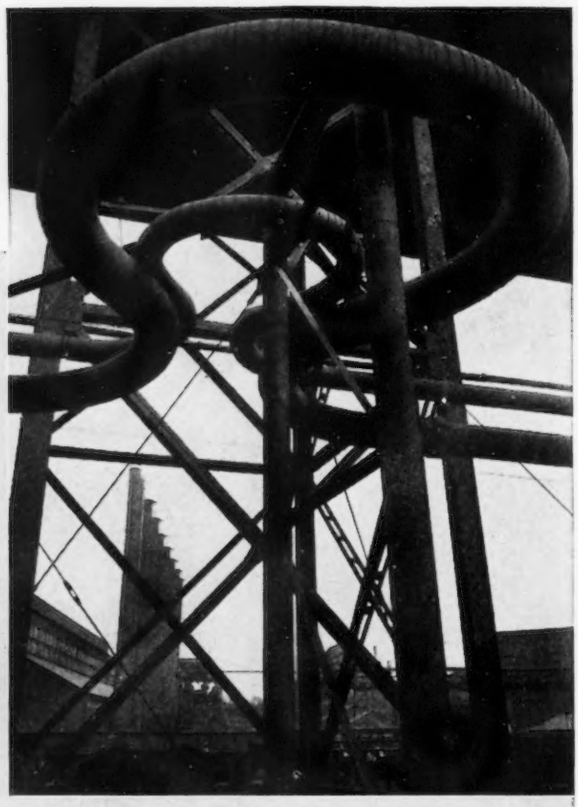
(3) **TRAVELING BRIDGE,** *man-trolley type, storing and reclaiming ore at a blast furnace.*

As engineers, manufacturers and contractors, we are prepared to assume entire responsibility for jobs such as these—all the way from design through erection.

Let us know of your problem. Whether a complete conveying system or an individual rig, our diversified experience with all types of material handling equipment will help you to obtain the correct, low-cost solution.

HEYL & PATTERSON INC.

50 WATER STREET PITTSBURGH, PA.



OVERHEAD
OR
UNDERGROUND

CAREY HEAT INSULATION CUTS COST OF TRANSPORTING STEAM

Sound engineering and correct insulation are problems of major importance to the economical transportation of steam.

For many years, CAREY has been meeting these problems of the power industry, with insulations which time has proved to be of maximum efficiency and permanence. CAREY Insulations are the development of more than 60 years of research and manufacturing experience. They meet every service condition from sub-zero to 2500° F.

Determining the many intricate problems of steam transmission—the correct insulations—thicknesses—costs—attainable results—all these come in the day's work for the CAREY organization. Regardless of what your insulation problem may be, you are always SAFE with CAREY.

Write for Carey Insulation Catalog—Address Dept. 26.

THE PHILIP CAREY COMPANY • Lockland, Cincinnati, Ohio

Dependable Products Since 1873

BRANCHES IN PRINCIPAL CITIES

Carey Magnesia-Asbestos HEAT INSULATIONS

Steel Payrolls Up 8 Millions in May

• • • **Both employment** and payrolls of the steel industry rose during May, according to the American Iron and Steel Institute.

An average of 510,000 employees was at work in May, as against 503,000 in April, while total payrolls in May amounted to $75,184,000 compared with $67,724,000 in April. In May, 1939, employment in the steel industry averaged 448,000, while payrolls totaled $60,372,000.

Wage-earning employees in the industry worked an average of 35.7 hr. per week in May, as against 33.4 hr. per week in April and 32.7 hr. per week in May of last year.

Earnings of wage employees averaged 85.1c. per hour in May, compared with the April average of 83.6c. per hour. In May a year ago, steel wage earners earned 83.5c. per hour.

Industries Demand Birth Certificates

Detroit

• • • **City, county and** state record agencies are being swamped by requests for birth certificates which are being required by industrial concerns as a means of checking on citizenship of employees. The rush to get such identification has been increased in Detroit by new requirements for citizenship proof on the part of all who cross the Detroit-Windsor international boundary, over which there has been a large volume of commuting and casual travel by Detroiters. Applications totaling 1500 a day are being handled by the State Health Department, which issues copies of birth certificates, and the city and county offices which do such work are crowded each day with applicants. Ford Motor Co. employees numbering 60,000 are expected to obtain birth records from the state office in July.

Homer Martin Will Sell Automobile Parts

Detroit

• • • **Homer Martin,** former president of the United Automobile Workers union—twice under the American Federation of Labor and once under the CIO—has entered business to sell parts and materials to the automobile industry. He is a partner of John Gillespie, Detroit politician, Republican leader in Wayne County, ex-millionaire and many times a negotiator in attempts to settle labor disputes in the Detroit area.

Martin and Gillespie are partners in the Industrial Mercantile Co., at 418 New Center Building. Gillespie is registered, however, as sole owner of the firm, which on May 1 filed in the assumed-name division of the County-Clerk's office as a new company doing business here. Martin is said to have started in the business June 1.

In the last five years the names of Martin and Gillespie have had a common denominator in the name of the Ford Motor Co. and also in the name of Harry Bennett, of the Ford plant service department. Mr. Gillespie arranged several settlements of strikes in parts plants supplying Ford, and was reported as being an employee of the Ford service department, although official status never was given to his participation in strike negotiations. Later, in the quarrel which split the UAW, the anti-Martin faction charged frequently that Martin and Gillespie, in meetings with Harry Bennett, tried to bring the UAW under Ford domination.

Largely as a result of such charges, Martin eventually split with the CIO.

Detroit Seeks Proposed Plane Engine Laboratory

Detroit

• • • **A detailed study** of what Detroit has to offer the National Advisory Committee for Aeronautics for engine research will be presented by the Detroit Board of Commerce before a sub-committee of N.A.C.A. which meets July 15. Detroit interests are urging the selection of Wayne County Airport, near this city, as the site for the proposed government aeronautical engine research laboratory.

. . . *And LANDIS GRINDERS*

Through intense research man has probed into some of the mysteries of the world. Through research he has tenaciously sought for answers to innumerable unknown things. Slowly over the years a great civilization is being built by the research man and his tools, and the future will continue to hold great promise of social and scientific achievement.

Landis grinding machines do their part in the search for better methods and materials. Below is pictured a Landis Universal and Tool Grinder in the research department of a world famous oil company where, because of the precision and versatility of its output, it serves as a research tool in the study of various oils. Landis grinders just as faithfully serve industry and mankind in the production departments after new things have passed the research stage. 338

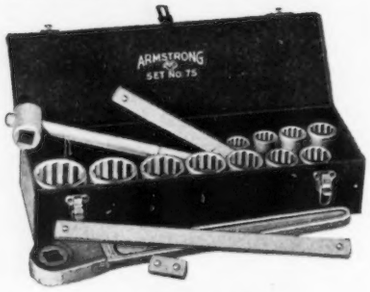
LANDIS TOOL CO.
WAYNESBORO, PA.

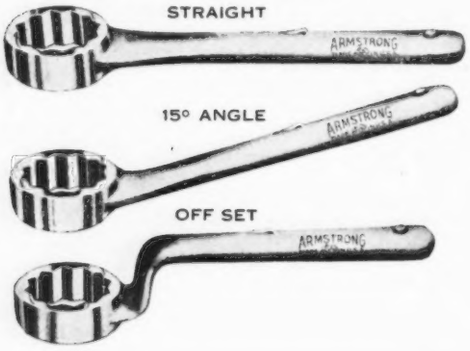
PRECISION LANDIS GRINDERS

ARMSTRONG

Heavy Duty Socket Wrenches

Among ARMSTRONG WRENCHES for large size work are the Extra Heavy Duty Detachable Head Socket Wrenches which come with openings from 1 1/16" to 2¾". Proportioned for hard service, they are machined from special Chrome-Vanadium Steel, are cadmium plated and have heavy duty, drop forged ratchets. Patented "Drivelock" prevents heads and sections from parting.





ARMSTRONG
Stub End Box Socket Wrenches

Strongly designed to take long slip-over tubular handles, these extra heavy, Chrome-Vanadium steel box socket wrenches will stand up to almost any leverage. Three types as illustrated with openings from 1¼" to 3½".

Write for Catalog

TUBULAR HANDLE

ARMSTRONG BROS. TOOL CO.
"The Tool Holder People"
309 N. Francisco Ave., Chicago, U.S.A.
Eastern Warehouse & Sales: 199 Lafayette St., New York

Buy ARMSTRONG TOOLS from your Supply House

FARQUHAR
HYDRAULIC PRESSES

If you plan to speed up production for more business in the months to come, follow the lead of the General Electric, Pennsylvania Railroad, American Chain and Cable and other great organizations. They rely on Farquhar engineering experience to design and build presses to meet their particular needs.

Farquhar builds hydraulic presses for stamping, forming, forging, bending, drawing, and straightening. Illustrated is a 1500-ton forging press designed to stand unusually great eccentric loading.

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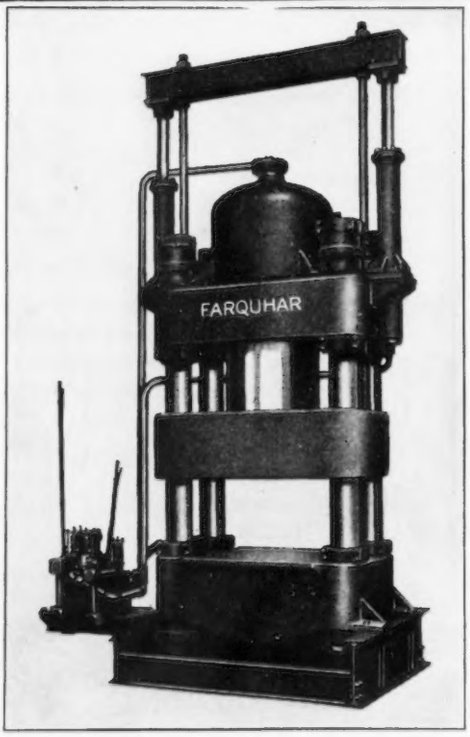


Republic Announces New Screw Steel

• • • **Union Drawn Steel** Division of Republic Steel Corp. announce a new bessemer screw steel and a new open hearth screw steel—said to be equal or superior in machining qualities to the finest and fastest screw steels available. Developed to overcome deficiencies in fast machining steels formerly available, it is claimed that bar after bar of these new steels can be machined at highest speeds with a resulting fine surface finish and without reduction in tool life.

Produced through the combination of modern chemistry and an advanced process of manufacture, these steels are sound and dense in structure, free from defects which cause internal seams and difficulties that lead to rejection of finished parts and which shorten tool life and disrupt continuity of high speed machining operations.

The new uniform fast cutting bessemer steel, Union Maxcut, has physical properties comparable to S.A.E. X 1112. It machines equally as well or better than the highest speed bessemer steel previously available. Parts show a smooth, fine finish when machined at 280 surface feet per minute with a basic feed of .0095 in. and an average tool life of more than 11 hours. The use of lighter feeds, of course, permits much higher cutting speeds. Union Maxcut responds to cyaniding and other case hardening features in a manner similar to S.A.E. X 1112.

Union Multicut, the new Union fast cutting open hearth steel, has physical properties similar to those of S.A.E. 1115. Parts show a fine finish comparable to that of bessemer screw stock when machined at 275 surface feet per minute with a basic feed of .0087 in. and an average tool life better than eight hours. With lighter feeds, this steel, according to Republic, can be run up to 350 surface feet per minute with satisfactory results. Union Multicut can be carburized and hardened to a minimum case hardness of C 60 Rockwell with either single or double quench. It produces a very tough, ductile core in case hardened parts with a minimum of distortion in quenching.

Rail Equipment Exports Exceed Whole of 1939

Washington

• • • **Railway equipment** exports during the first five months of 1940 were reported by the Commerce Department's Transportation Division this week to have exceeded in value the exports of similar equipment for the entire year of 1939.

Exports through May, 1940, totaled $9,112,933 against $8,365,922 for the 12 months of last year, the department said.

Shipments of locomotives, rolling stock, parts and miscellaneous equipment during May, amounting to $2,182,647, were about $609,500 under April exports but were well above the value of shipments of the previous months of 1940.

Railway equipment shipments for May listed as "outstanding" included 23 steam passenger cars worth $492,079, to Portugal; and 357 freight cars costing $847,027 to Brazil. An unusual shipment of the month was three diesel or diesel-electric locomotives to British Guiana, the second shipment of railway equipment to that country in 11 years.

Metalworking Classes For Chicago Schools

• • • **As a result** of publicity given the shortage of skilled labor in the metalworking and related industries, the public school systems of Chicago and Gary, Ind., are taking steps to increase the number of students who can be trained in their vocational and trade schools. At Chicago it is planned this summer to keep open four technical high schools on a 24-hour basis. Classes will be offered for machinist, sheet metal workers, auto and aircraft mechanics, electricians, cabinet makers, welders and draftsmen. More than 3000 students will be accommodated.

A contemplated school program at Gary, Ind., would include courses in machine operation, welding, electricity, mechanical drawing, sheet metal work, blueprint reading, precision instruments, pipe fitting, auto mechanics and radio.

Certified Quality

STEEL ROOFING AND SIDING

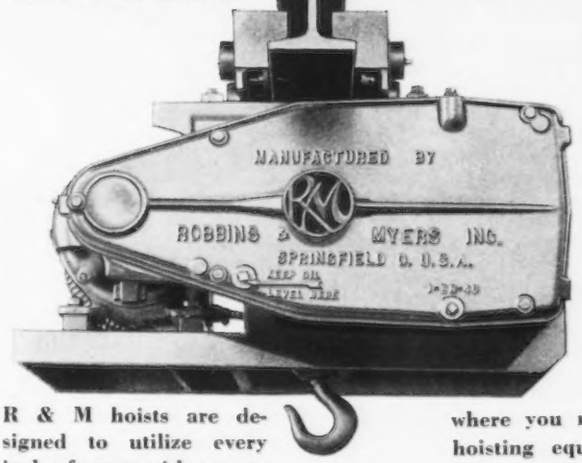
This practical material for industrial plants, warehouses, garages, sheds, etc., is economical, durable and easy to apply. There are 14 styles of Continental building sheets made of special analysis or copper bearing steel . . . all have a zinc coating applied by the Superior Process.

CONTINENTAL STEEL CORP., Kokomo, Indiana. Plants at Kokomo, Indianapolis and Canton

CONTINENTAL

OPEN HEARTH STEEL SHEETS

R&M NEW STEEL LOW-HEADROOM HOISTS



Save Space and Money

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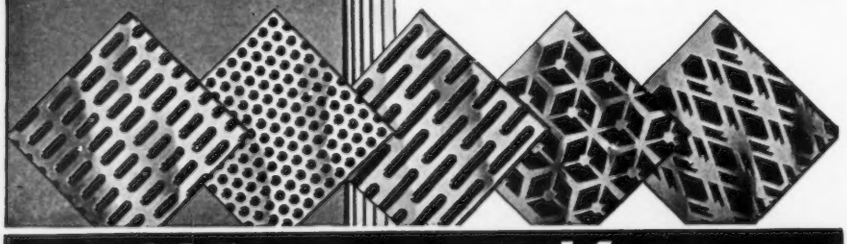

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$5,000,000 Contract for Armed Scout Cars

Washington

• • • **Out of a total** of $41,564,986 in awards authorized from the 1941 appropriations and made public last week by the War Department, contracts went to these companies among others:

The White Motor Co., Cleveland, scout cars with spare parts, $5,387,500; Sperry Gyroscope Co., Inc., Brooklyn, N. Y., anti-aircraft fire control instruments, $4,571,887; Auto-Ordnance Corp., New York, sub-machine guns with spare parts and accessories, $877,723; New Safe & Lock Co., York, Pa., gun carriages, anti-aircraft, $794,300.

Breeze Corp., Newark, N. J., fire control appliances, anti-aircraft fire control appliances, $775,991; Keuffel & Esser Co., Hoboken, N. J., fire control instruments, $719,327; Delco Appliance Division, General Motors Corp., Rochester, N. Y., anti-aircraft fire control appliances, $532,500; the Midvale Co., Philadelphia, gun tubes, $428,736; and the Eastman Kodak Co., Rochester, N. Y., panoramic telescopes and spare parts, $242,560.

The scout cars ordered from the White company were described by War Department experts as armed with machine guns and designated as a substitute for horse cavalry used before the days of mechanized equipment.

Railroad Men Warned To Keep Cars in Shape

Chicago

• • • **More than** 500 members of the mechanical division of the Association of American Railroads, which met in Chicago last week, heard their chairman, F. W. Hankins, assistant vice-president and chief of motive power, the Pennsylvania Railroad, stress the need for keeping all cars in the best of mechanical shape so as to be in condition to meet any demands upon transportation facilities as the National defense program expands. Committee reports were read and discussed on wheels, prices for labor and materials, specifications for materials, car construction, locomotive construction, brakes and brake designs, and related subjects.

Contracts Given For 45 Warships

Washington

• • • **To require a total** of 55,000 tons of steel and 11,000 tons of armor plate, the 45 vessels on which the Navy awarded contracts on Monday are the first ships to be contracted for under the new Walsh-Vinson law to expedite naval shipbuilding under which the Navy is authorized to negotiate contracts without regard to the usual competitive bidding requirements.

The 45 vessels, involving a total displacement of 193,000 tons and a total cost of $413,540,300, were awarded to these companies:

Electric Boat Co., New London, Conn., 13 submarines at $2,795,000 each, total $36,335,000.

Bethlehem Steel Co., Quincy, Mass., four cruisers at $23,618,000 each, total cost $94,472,000; and four cruisers at $18,573,000 each, total cost for eight cruisers, $168,764,000.

Bethlehem Steel Co., Union Iron Works plant, San Francisco, two destroyers at $5,977,000 each, total cost $11.954,000.

Bethlehem Steel Co., Staten Island plant, two destroyers at $7,431,000 each, total $14,862,000.

New York Shipbuilding Corp., Camden, N. J., three cruisers at $18,657,800 each, total $55,973,400.

Federal Shipbuilding & Dry Dock Co., Kearney, N. J., six destroyers at $7,159,700 each; two destroyers at $8,500,000 each and two destroyers at $5,277,000 each, total cost of ten destroyers $70,512,200.

Bath Iron Works, Bath, Me., six destroyers at $6,813,200 each, total $40,879,200.

The additional award of one seaplane tender (large) authorized by the 1941 Appropriation Bill was given to the New York Shipbuilding Corp., Camden, N. J., at a cost of $14,260,500.

In addition, contracts for three aircraft carriers and two cruisers will be awarded shortly, having been temporarily withheld pending further negotiations with shipbuilding companies.

Navy Department officials estimated that enactment of the Walsh-Vinson bill effected a saving in the 45 ships just ordered of from $16,000,000 to $17,000,000 or the equivalent cost of an additional cruiser.

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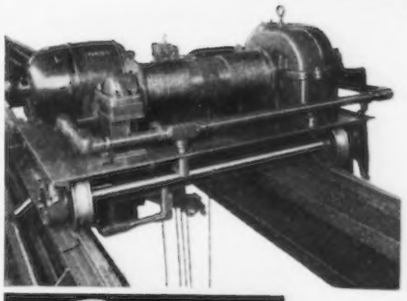

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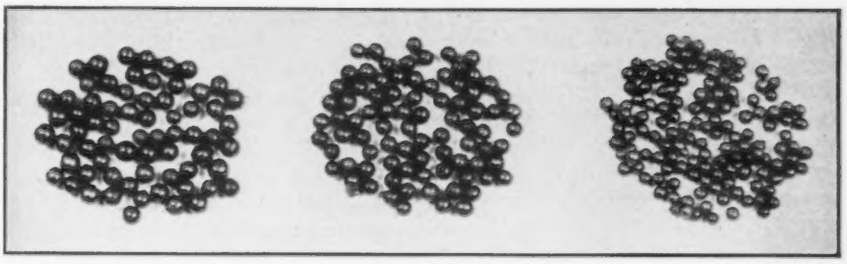

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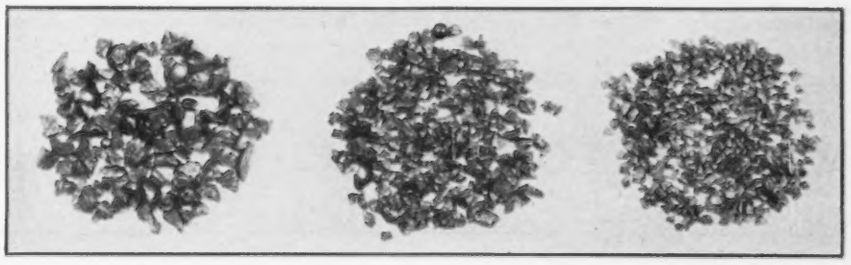


New Deal Is Real Bottleneck In Arms Program, Auto Industry Says

W. F. SHERMAN

Detroit

Because public opinion is fixed on the idea that a real defense program has already been begun in the United States, there is real danger, it is believed by industry here, that eventual disillusionment of the public mind on this vital subject will react in such a way that industry, and the automobile industry in particular, will be the "goat."

The automobile industry has certain basic assets in the form of men, machines and methods which are indispensable to the carrying out of an adequate modern defense program. In the present declared state of emergency, these assets have been offered for use by the government and, within limits, have been employed in the initial stages of a national rearmament program.

However, in the mind of the layman, concepts of mechanized defense have been exaggerated by political speeches and large doses of news on the subject. Lack of understanding of the problems involved in tooling a major program has permitted John Public to race ahead of facts, so that even in supposedly well-informed quarters, such an attitude has been detected.

A widespread impression is that a great deal of actual military production is going on in Detroit on tanks, airplanes, engines, guns, shells, etc., or that at least large scale preparations are being made quietly for production of these items.

Inquiries reaching this writer indicate that there is a general belief that manufacturing for defense purposes actually is underway in Detroit plants on an important scale. There is anticipation that wave upon wave of airplanes, long lines of tanks and huge supplies of armament will shortly be issuing from factories in this area.

As a matter of record it should be stated emphatically now that nothing could be farther from the truth. A factual analysis of what is going on in this industry and others is probably one of the most important contributions to a sane defense program that could be made at this time.

True, defense plans are the most important and serious part of the conferences and negotiations in which the automobile industry is engaged today. But so far, nothing has "jelled." In some cases, it is known, manufacturers are discussing with officials in Washington as many as half a dozen proposed projects. However, no decisions on major points are being made yet, automobile executives report, largely because official Washington does not seem to know today what it wants produced in auto plants. The so-called bottlenecks in the defense program exist principally in the capital, according to automotive executives who have been in intimate contact with the problem.

So serious is this threat of a damning public reaction that there is a move afoot in Detroit this week to put the industry on record on this subject so that there can later be no unwarranted criticism or implications that the industry has failed to meet its obligations to the nation.

The automobile industry regards with genuine anxiety the deluge of Washington-generated publicity that has swept the public off its feet in the last six weeks and is likely to voice its views on this subject to the public shorty. Already some approaches to Washington have been made in an attempt to quiet the unofficial and semi-official blasts of publicity, characterized by one commentator as "political hoopla."

One automotive company's spokesman compared the defense program, as it has been operated to date, with NRA and other features of the New Deal, charging that the atmosphere was filled with political speechmaking about defense. He said that there is likelihood that "we will get no more defense than we did prosperity out of the same kind of program." This same commentator charged that negotiations so far at Washington had been "with people who had no authority to act."

On the part of some who have offered important production facilities to the government there is resentment because no specific assignments were given to them. Instead, they said, the government spokesmen in Washington tell industry "to go ahead, build up a half a dozen, and we'll see."

Tooling for materials of war cannot be produced without orders from the government or without an official go-ahead signal, they point out, nor can industry be held responsible six months hence for failure to start now on a program

Writer Finds Detroit Plants Unable To Learn What They Are To Produce

IN WHAT IS ONE of the most newsworthy and significant stories written during the efforts of the United States to arm for defense, William F. Sherman, Detroit editor of THE IRON AGE, reports that the federal government so far has placed no mass production orders for war equipment in Detroit except trucks.

"The so-called bottlenecks in the defense program exist principally in the Capital," Mr. Sherman writes. Already, he says, the automobile industry is concerned lest it be made the "goat" by politicians who do not know what they want produced in the automotive plants.

WAITING FOR ORDERS:

THROUGHOUT THE U. S. are vast industrial plants ready to do their part in national defense. Shown on the opposite page is a striking Pilotview of the Ford Motor Co.'s great Rouge plant which, like other U. S. plants, is "waiting for orders" from Washington.

Ford

which, it learns in Washington, is nebulous to the nth degree.

The attitude taken here is that unless the facts are made plain now, the time will come, possibly in the midst of political campaigning, when industry will be forced to shoulder the blame because the defense program has not by that time flowered into large scale production of military necessities. More than that, leaders of the industry have said privately that they fear that the National Defense Advisory leaders, Knudsen, Stettinius, Budd, Batt, and Vance, et al, will find that their contributions and sincere efforts will be overlooked and discounted when the political arena reaches its peak of activity.

Ford of Canada Expands To Build Gun Carriers

WALLACE R. CAMPBELL, president of the Ford Motor Co. of Canada, announced Monday that contracts have been awarded and work will begin immediately on a $700,000 expansion of the company's East Windsor plant.

Facilities will be increased to handle Canadian government war orders and to turn out 50 machine gun carriers a week. The 15-acre Ford machine shop will be expanded to 109,440 ft. of floor space, Mr. Campbell said.

A fair appraisal of what is going on today, according to Detroit industrial leaders who have visited the Washington scene and returned to report to their own companies, is that the national defense leaders, drafted from industry, are engaged in a real shirt-sleeve job at Washington. They have little time to answer queries of the press, nor are they inclined to to study their every step to try to decide the publicity value of the moves they make. But unofficial tipsters and part of Washington officialdom appears to be engaged in making political capital of the situation—thus the apparent sponsorship of what the auto industry regards as premature publicity on the projects which the industry is weighing.

Over and over again auto executives emphasize that no orders have been placed yet for the mass production of anything except trucks. Tooling up for whatever projects may finally be allotted to auto plants cannot be accomplished overnight. While negotiations are being conducted, the delivery dates on equipment are becoming more and more extended, they point out. When the day of final reckoning is reached the efficiency of the industry in tooling up for military necessities must be measured from the date of the official go-ahead signal, not from some day in May or June, 1940, when the project was first discussed with the government.

Ford Tooling For Airplane Engines For U. S. Continues

Detroit

• • • **The Ford Motor Co.** is continuing plans for tooling the Rolls-Royce engine for mass production despite the breakdown in negotiations with the United States government. Three hundred Ford technical men—most of the Ford Rouge and Lincoln plant tool engineering staffs—are engaged in the project.

Plans for production of complete airplanes, if any, are temporarily being soft pedaled, although it is understood that some of the Ford technicians are devoting their time to analysis of production methods for airplanes, wings and fuselages.

Despite announcement from the National Defense Commission that "cooperation in the production of this important military equipment will be sought elsewhere," issued after Mr. Ford turned down the government order, there is so far no indication that any concern in the automobile business will take on the assignment. General Motors itself already is burdened with the Allison production problem, and Chrysler is reliably reported to be unwilling to depart from the automotive field to engage in aircraft manufacture. The full extent and the limit of Chrysler intentions is to stick to automotive production, with which it is familiar, and possibly to take on the production of tanks or tank parts, which it considers analogous to automotive production, and to continue its work with army educational orders on the machining of certain military requirements such as shells. In other words, Chrysler officials have indicated they are opposed to any attempt on their part to manufacture an airplane engine or airplanes.

With some sources intimately familiar with the Ford-U. S. deal, it is understood that when the showdown was reached, Mr. Ford was told that the Ford Motor Co. must accept the split order (3000 for the U. S. government and 6000 for the British government) "or else." Mr. Ford is reported to have said, "Well, it is 'or else,'" and then to have left the meeting.

It has been difficult to get any interpretation of the Ford attitude because in the last week Mr. Ford has shied away from press interviews. However, the distinction seems clear in Mr. Ford's mind, that he will use his English plants to produce for English defense purposes, and his Canadian plants to produce for Empire defense, but that he will not permit his American plants to be employed in producing materials for any warring foreign nation. To the outsider the distinction may appear strange, but to those familiar with Ford and his methods, there is nothing strange about it. Like his "rightness" in the matter of NRA and his success so far in withstanding adverse decisions of NLRB, the Ford attitude now appears to be that when engines really are needed, the government will turn to him, and that he, alone, will be tooled up to produce in volume.

He continues to prepare for production and expects to be able to build Rolls-Royce engines starting Jan. 1.

"We will be ready to go at the drop of a hat," Ford's spokesman said Monday. He added that the Ford original offer still stands and that the company will produce engines if the famous Ford "ifs" are accepted by the government.

So far no orders for machine tools have been placed by Ford for the Rolls-Royce engine. However, inquiries have been made and continue to be made by the Ford machine buying organization. Vendors throng the purchasing lobby and the outer precinct of the Ford tool engineering department each day.

Steep Excess Profits Tax To Pave Way For More Spending On Defense

Washington

Expansion of steel making and other facilities for the national defense has begun to take on definite plans, as Congress, reconvening after a week's recess, set itself for further expenditure and was told by the President to enact at once "a steeply graduated excess profits tax, to be applied to all individuals and corporations without discrimination." Early enactment of the law is expected. It was asked to aid in financing the enormous program, to be supplemented by additional large appropriations and authorizations.

For the Navy alone another $4,000,000,000 is expected to be appropriated to increase its tonnage by some 70 per cent. Large appropriations, which may range up to an amount equal to that to be added to the Navy program also are expected to be made for the War Department.

In the steel industry it is reported that the government contemplates a large expansion of facilities for the manufacture of armor plate for cruisers, tanks, aircraft guns and so forth in order to "iron out bottlenecks."

The War Department, as pointed out in THE IRON AGE of June 27, page 89, is said to be speeding plans for the construction of a chain of 139 ordnance, chemical, quartermaster and aircraft plants, estimated to cost $527,000,000. Both the erection and supply of the plants will mean a heavy demand on the steel industry while metal-working industries will be called upon for large quantities of equipment.

For the construction of additional facilities, the Reconstruction Finance Corp. has available approximately $1,000,000,000. A plan it has devised gives preference to private industry to do the job. The government agency would lend the required money, if that is desired, as undoubtedly it will be in many instances. Repayment to the RFC would be made out of sales of plant production. The financial risk would rest with the government while at the same time it would avoid responsibility of operation by leaving that to private corporations. This proposal promises to become effective if it has not already been applied to a limited degree. Troubling both the government and private industry are such questions as depreciation, maintenance, and other costs. While a formula is under consideration, final determination may rest with Congress and be set forth in the excess profits legislation. Secretary of the Treasury Morgenthau has conferred on the subject with Chairman Doughton of the House Committee of Ways and Means, Chairman Harrison of the Senate Finance Committee and experts of the Joint Committee on Internal Revenue Commission. It is reported that Mr. Morgenthau is inclined to be less liberal than officials in other executive branches of the government.

At a press conference on Monday, Mr. Morgenthau declined to commit himself on any particular form of excess profits tax but he reiterated that the Treasury Department, after having spent "months" working on the subject, is ready to testify when called before the House Ways and Means Committee.

Neither would Mr. Morgenthau say whether his department favored the consideration of an excess profits tax in conjunction with an amortization plan to help speed up national defense. He said that was entirely the responsibility of Congress although he emphasized that the Treasury Department has not been working on any amortization plan.

Congressional tax experts have insisted recently that it would take the Treasury Department at least 60 days to present an excess profits tax recommendation to Congress but

J. D. MOONEY, left, has been appointed executive assistant to C. E. Wilson, acting president of General Motors Corp., in full charge of all negotiations involving defense equipment. Albert Bradley, right, vice-president in charge of finances for General Motors, has also been made executive assistant to Mr. Wilson.

Mr. Morgenthau specifically denied that such a delay would be necessary. He expressed himself at a loss to know how such rumors got around.

The procedure under which the cost of special facilities found necesary under defense contracts can be determined with respect to the revised profits limitation of the Vinson-Trammell Act also was outlined by Treasury Department tax experts on Monday. Treasury Department General Counsel Edward H. Foley, Jr., explained the provisions of an executive order signed late last week by President Roosevelt, pointing out that the Treasury regulations are necessarily very broad, with the subsequent determination of what additional equipment purchased by a manufacturer can be included under costs to be made the subject of negotiation between the War and Navy Departments and the Bureau of Internal Revenue.

The new profits limitation has been reduced from 10 per cent on ship construction and 12 per cent on aircraft down to 8 per cent on all contracts. Government officials previously had erroneously said profits on negotiated contracts were limited to 7 per cent. Under the procedure outlined by Mr. Foley, the Secretaries of Navy or War certify to the Internal Revenue Bureau the additional facilities acquired to perform the contract; the estimated cost and the percentage of cost which the contracting party proposes to charge against the contract. If the Commissioner of Internal Revenue does not object within five days to the manner of treating costs under the certification, the proposed treatment of cost becomes binding upon the government. Heretofore, the War and Navy Departments had nothing to do with the certification of costs in computing profit limitations.

Federal Loan Administrator Jesse H. Jones, acting under a recent amendment to the RFC Act, on Monday announced the creation from a fund of about $250,000,000 of two corporations to acquire and carry strategic materials. One is the Metals Reserve Co., and the other is the Rubber Reserve Co. Each has a capital of $5,000,000. The Metals Reserve Co. has agreed with the International Tin Committee, represented by Victor A. Lowinger of London and John Van den Brook of Batavia (Dutch East Indies), that it will buy 75,000 tons of tin which it will hold as a reserve stock. The government corporation has agreed to buy its tin reserve stock at 50c. a lb., c.i.f., United States ports to be specified by the company.

The Rubber Reserve Co. has agreed with the International Rubber Regolation Committee, represented by Sir John Hay, that it will buy a reserve stock of rubber of 150,000 tons over a period of months at a price range basis between 18c. and 20c. a lb., c.i.f. New York.

Regarding the plan to buy tin, Mr. Jones pointed out that the world supply of this metal is controlled by the International Tin Committee. He said the agreement calls for an increase in world production of tin so that the reserve can be acquired without interfering with the current demand for tin or affecting the current price.

The RFC has authorized loans to the Metals Reserve Co. of $100,000,000 with which to buy and carry the tin and other metals. The tin producing countries parties to the agreement are Belgian Congo, Bolivia, French Indo-China, the Malay States, Netherlands East Indies, Nigeria and Thailand.

The 150,000 tons of rubber, with the 85,000 tons recently acquired through the barter agreement with Great Britain in exchange for cotton, it was stated, will provide a reserve supply of rubber in the United States of approximately 235,000 tons, in addition to current stocks held by the industry.

The capital of the Rubber Reserve Co. will be owned one-half by the RFC and one-half by the principal rubber manufacturers, and the reserve supply will be acquired from additional production of rubber allowed by the International Rubber Regulation Committee as a result of this contract, so that there will be no lack of rubber to meet current demands, and no occasion for unusual competitive bidding by the industry for normal requirements.

The RFC has authorized loans to the Rubber Reserve Co. of $65,000,000 to purchase and carry the rubber. The rubber producing countries are: Malaya; Netherlands Indies; French Indo-China; Ceylon, India; Burma; North Borneo; Sarawak; and Thailand.

The Treasury Department's Procurement Division, which has been doing the purchasing of all strategic materials for the War and Navy Departments to date, has been given a new executive head. He is Clifton E. Mack, government "career man" and special agent for the Bureau of Internal Revenue for the past 10 years. Mr. Mack succeeds Donald M. Nelson, who resigned from his post as director of procurement after President Roosevelt last week designated Mr. Nelson as coordinator of purchases for the National Defense Advisory Commission.

In his short tax message, President Roosevelt left to Congress the fixing of rates and method of application, saying that, "It is our duty to see that the burden is equitably distributed according to ability to pay so that a few do not gain from the sacrifices of the many."

An indication of the kind of bill that will be enacted was given by House Leader Rayburn who said that the levy would follow that of the World War era, which "raised a lot of money." The Ways and Means Committee likely will report the bill out soon. It is taken as a foregone conclusion that the excess profits taxes, to be added to the recently enacted $1,000,000,000 tax law, will, like the latter, be applied retroactively to 1940 income. It is assured that the taxes will be extremely high.

It has been suggested that it may follow the pattern of the amendment of Senator Connally of Texas which had been tied to the new tax law but was struck out. It would levy a 22 per cent tax on corporations with normal tax net incomes of $25,000. For corporations with less income the rate would be 14½ per cent on amounts not in excess of $5,000; 16 per cent on $5,000 to $25,000 and 18 per cent on $25,000 to $50,000, with a provision to smooth out the rate for incomes in the neighborhood of $25,000. Rates as high as 88 per cent were proposed on individual incomes of $1,000,000,000 and like rates may be expected for high corporation net incomes.

Great Britain Gives Full Powers To Its Buyers in Canada and U. S.

Ottawa

• • • **C. D. Howe, Minister** of Munitions and Supply, announced that his department takes over the work previously done by the British Supply Board in Canada and will place orders direct for the British government. This arrangement will expedite the placing of orders for British requirements and generally speed up the production of munitions of war in the Dominion.

Since the outbreak of war, while it has placed many of its orders through the Department of Munitions and Supply, the British Supply Board has operated as a separate purchasing organization under the direction of Lieut.-Col. J. H. M. Greenly as controller general and chairman. Lieut.-Col. Greenly, who has returned to England, had with him here a large administrative staff. Some of these have also returned to England and others intend to do so. The major part of the personnel of the British Supply Board, however, will remain here and they will be used by the Department of Munitions and Supply as technical assistants and to carry out inspections for British orders.

The work of the British Supply Board in Canada has been concerned mostly with the production of shells, explosives and ships and since the outbreak of the war, orders in the amount of approximately $75,000,000 have been placed and commitments up to approximately another $50,000,000 have been undertaken.

British Will Meet Cost Of Canadian Plant Expansion

Ottawa

• • • **The British Supply Board** has assumed the capital cost of plant construction on behalf of some 35 Canadian companies, according to the Department of Munitions and Supply. By far the largest proportion of these plants are already producing munitions, explosives and other war material. But several are still under construction and two are to be built shortly.

For these capital expenditures, involving the construction both of new plants and extensions to existing manufacturing facilities, the British Supply Board has now made commitments well in excess of $50,000,000.

With almost all of these capital expenditures, the British Supply Board has assumed the full cost of construction together with the cost of the necessary machinery and equipment. In a few instances, however, a lump sum payment has been made to a manufacturer in order to permit plant extensions adequate to meet the needs of the board.

The policy pursued has been to pay for plant extensions where existing manufacturing facilities permit their expansion.

Canada Appoints Oil, Steel Controllers

Ottawa

• • • **Wide powers are being** vested in the several controllers being appointed by the Department of Munitions and Supply of Canada. The two latest additions are controllers of oil and of steel. The War Measures Act is of the broadest scope and all the authority being delegated to these officers derives from it. For example, in the case of the oil controller, he can if the circumstances warrant it, take over the whole business in oil—operate plants and refineries, fix prices, require licenses from those in the business and generally, exercise the fullest control. The steel controller and the officers have much of a corresponding authority. To what extent powers will be exercised will depend upon conditions as they are met or develop. There is not expected to be any arbitrary exercise of them and cooperation with rather than the superseding of any local authorities in any similar lines is expected.

Shipbuilding operations are proceeding at a rapid rate. C. D. Howe, Minister of Munitions and Supply, stated that "a month ahead of schedule, ships of Canada's naval construction program are now being launched at ports in Eastern Canada. Further launching in the $50,000,000 90 ship program will probably occur almost weekly until the end of the year." Word from Midland is to the effect that six motor launch bomb tenders for use of the Royal nadian **Air Force have** been delivered by Midland Boat Works to the Dominion War Supply Board. The boats are designed to transport bombs from shore to sea planes.

Mr. Howe announced that industry has joined hands with the government and military technical experts to hurry production of heavy tanks. Canadian industrial leaders and steel experts were reported to be making steady progress toward production of tanks and munitions. Minister Howe reports the placing of 300 large British type tanks of a type now in use. Many difficulties beset Canadian industry in the building of tanks. The huge armored perambulating forts are protected with armor plate more than 4 in. thick of a type not readily obtainable in Canada. In addition, such heavy metal monsters require extremely powerful motors. They need Diesel engines, heavier and more powerful than those in production in Canada. Familiar with United States production methods and specifications, Canadian industry will likely use them where possible, especially in regard to machine tools, most of which come from the United States.

McKee Contracts At All-Time Peak in May

Cleveland

• • • **New contracts taken** by Arthur G. McKee & Co., Cleveland, up to June 20 were 55 per cent greater than the total dollar volume of contracts taken during all of 1939, according to the recent letter to stockholders from Robert E. Baker, secretary. More than 97 per cent of the business taken this year is for contracts on construction in the United States. Volume of May contracts was largest in the company's history.

Roosevelt Sets up Licensing System for Tool, Arms Exports

Washington

• • • President Roosevelt on Tuesday signed the May-Sheppard bill authorizing a restriction on exports of essential materials, and immediately issued a proclamation setting forth the list of materials which, after July 5, cannot be exported except under license. Mr. Roosevelt said that only materials on which there are actual or prospective shortages as a result of the national defense program are included.

Among the items listed as being subject to the new export restriction are:

1. Arms, ammunitions and implements of war which are already restricted under existing neutrality legislation.

2. The following basic materials among others — aluminum, antimony, chromium manganese, molybdenum, tin, tungsten, vanadium.

3. A group of 11 chemicals.

4. Aircraft parts and equipment, armor plate, and machine tools, specifically including metal working machinery for melting or casting, pressing into forms, cutting or grinding, and welding.

The Secretary of State was empowered in the proclamation to issue the export licenses. The president directed the National Defense Advisory Commission's Materials and Production Division to collaborate with an administrator of export control in the determination of the restricted items and the extent and character of the controls to be exercised.

In designating the administrator of export control, Mr. Roosevelt invoked the authority vested in him as commander-in-chief of the Army and Navy and named Col. Russell L. Maxwell, U. S. Army.

The military order issued by the President directed Colonel Maxwell to administer the export control provisions of the law under the direction and supervision of the President.

The President made public the proclamation at his Tuesday press conference, at which time he was asked specifically about the possible inclusion of scrap iron and steel at a subsequent date.

The question had been raised, Mr. Roosevelt related, but the National Defense Advisory Commission advised that there was no necessity for restricing the exports of scrap at this time. It was indicated that the proclamation sets up all the controls considered necessary for the present.

June Pig Iron Output Up Almost 12 Per Cent

• • • Production of coke pig iron (partly estimated) in June totaled 3,804,800 net tons, compared with 3,513,683 tons in May. On a daily basis, June output showed a gain of almost 12 per cent over that in May, or from 113,345 net tons to 126,000 tons in June, indicating a rate of operation in that month of 83 per cent of capacity, against 74.8 per cent in May.

There were 181 furnaces in blast on July 1, compared with 172 in operation on June 1. United States Steel Corp. blew in three furnaces and took one off blast, independent producers blew seven in and blew out or banked one furnace, and one merchant furnace was blown in.

Among the furnaces blown in were: One Edgar Thomson, one Ohio, and one South Chicago (old), Carnegie-Illinois Steel Corp., one Lackawanna, Bethlehem Steel Co., one Haselton, one River, and one Betty, Republic Steel Corp.; one Grace, and one Iroquois, Youngstown Sheet & Tube Co.; one Zenith, Interlake Iron Corp.; and one Claument, Wisconsin Steel Co.

Two furnaces blown out or banked were a Ford Motor Co. unit and one Mingo furnace of Carnegie-Illinois Steel Corp.

Hill Clutch Acquires Acme Machinery Co.

Cleveland

• • • **Hill Clutch Machine & Foundry Co.**, 6400 Breakwater Avenue, Cleveland, has purchased the Acme Machinery Co., 4533 St. Clair Avenue, and hereafter the company will be known as The Hill, Acme Co., according to A. C. McDaniel, president.

Hill Clutch, which took over Canton Foundry & Machine Co. in 1937 several years after merging with Cleveland Knife & Forge Co., produces power transmission machinery, heavy duty surface grinders, and special machinery and runs a jobbing foundry. Acme Machinery Co. manufactures upset forging machines and threading machines. The Acme division has been doing business in excess of $2,000,000 per year.

Acme will continue to operate in its own plant. Present personnel, including Karl F. Bruch, president, and E. P. Bruch, secretary-treasurer, will continue.

The Hill Clutch Co. was started by the late Jacob Perkins and his son Ralph is the present board chairman. Hill Clutch is located on a 6-acre site overlooking Lake Erie near the easterly entrance of Edgewater Park.

Mr. McDaniel said both the Cleveland Knife & Forge Co. and the Canton Foundry & Machine Co. retain their identity and will continue to be operated as divisions of the Hill, Acme Co.

Terms of the Acme deal while not revealed were understood to include cash and stocks.

10 Destroyers Allocated To Government Yards

Washington

• • • **The Navy Department** late last week allocated construction of 10 destroyers and nine submarines to cost $154,577,000 to five government navy yards, Steel requirements were estimated at 12,000 tons for all 19 vessels.

Bids will be opened July 29 by the Maritime Commission for construction of three C-3 type passenger and cargo vessels for the American South African Line, Inc., New York. The ships will require approximately 13,110 tons of steel.

The commission has made awards to the Maryland Drydock Co., Baltimore, for reconditioning the ship Deer Lodge for $124,421 and the ship West Celeron for $136,960.

Personals

Change is inevitable in progressive Industry. Change is constant.

• **Harry K. Clark** has been made vice-president and general manager of the Norton Co., Worcester, Mass., to succeed **Aldus C. Higgins,** who remains with the company as president. Mr. Clark, who is also executive officer of the company's Canadian subsidiary, has been associated with the company for 25 years. He is also a director of the Behr Manning Corp., Troy, N. Y., and of the Australian Abrasive Pty., Ltd. Mr. Clark is an active member of the Grinding Wheel Manufacturers Association and president of the American Supply and Machinery Manufacturers' Association.

H. K. CLARK, vice-president and general manager of the Norton Co.

• **Warren W. Scherer** has been appointed superintendent of maintenance at the Homestead works of Carnegie-Illinois Steel Corp., Pittsburgh, and **Fred C. Frame** has been made superintendent of industrial relations at Irvin works, succeeding Mr. Scherer. Mr. Scherer was with the corporation since 1920, serving in the maintenance department at the Clairton works until 1937. He later was assistant superintendent of construction at Irvin works, superintendent of maintenance, and subsequently superintendent of industrial relations. Mr. Frame was plant industrial engineer at the Wood works from 1936 to 1938 at which time he was made plant director of training at Irvin works.

• **John C. Harrington,** heretofore vice-president of the National Forge & Ordnance Co., Irvine, Pa., has been elected president and general manager. He has been identified with the company for the past 25 years in production, sales and management.

• **Francis H. Gibson** has been appointed general manager of sales of South Chester Tube Co., Chester, Pa. Formerly manager of the Pittsburgh district office, Mr. Gibson is the third generation of his family to serve this company, his grandfather and father having sold pipe to the elder Rockefeller and other pioneers in the oil industry.

FRANCIS H. GIBSON, new general manager of sales, South Chester Tube Co.

• **Andrew B. Holmstrom** has been made vice-president and works manager of the Norton Co., to succeed **George N. Jeppson,** who resigned the works managership but who continues as vice-president and treasurer. Mr. Holmstrom has been with the company for 20 years as an engineer and in plant management. He has been works manager of the abrasive division since 1939.

ANDREW B. HOLMSTROM, vice-president and works manager of the Norton Co.

• **F. A. Beardsley,** who for the past 10 years has represented the National Forge & Ordnance Co., along the Eastern seaboard, has been made sales manager.

• **W. J. Frederick,** Frederick Steel Co., has been elected chairman of the Cincinnati chapter, American Society of Tool Engineers, for the coming year. Other officers include **Tom Kling,** Lamson & Sessions Co., vice-chairman; **Charles Carr,** R. K. LeBlond Machine Tool Co., treasurer, and **W. D. Averill,** Cincinnati Milling Machine Co., secretary.

• **Frank T. Murphy** has been made manager of sales of the St. Louis district by the Globe Steel Tubes Co., Milwaukee, with **Neal E. Boeckler** as assistant manager of sales. **Gilbert H. Krohn** has been transferred from manager of sales,

Wisconsin district, to sales agent at Chicago, where he will be associated with **John W. Floto,** vice-president. **Clarence A. Schroeder** has been made manager of sales, Wisconsin district, with office at Milwaukee.

Harold P. Ingram has been appointed general superintendent of Carnegie - Illinois Steel Corp.'s Canton, Ohio, roll and machine works, succeeding **William A. Harris,** who is retiring upon completion of 34 years of continuous service with U. S. Steel Corp. subsidiary companies.

Mr. Ingram began his career in the engineering department of Westinghouse Electric & Mfg. Co. in 1913. He entered the roll department of the Homestead works of Carnegie-Illinois in 1915 and from 1920 to 1928 was employed as a draftsman. He was superintendent of the Homestead roll department from 1928 to 1937 and has been superintendent of maintenance at Homestead since 1938.

Mr. Harris became associated with U. S. Steel subsidiaries at the American Tin plant as assistant chief engineer in 1900. He was secretary and chief engineer of Lewis Foundry & Machine Co. from 1902 to 1906, when he went to Canton as manager of the roll and machine works for American Sheet & Tin Plate Co. Mr. Harris became works general superintendent in 1936. He is a member of the American Society of Mechanical Engineers, American Foundrymen's Association, and American Iron and Steel Institute.

Frank K. McDanel has been made vice-president in charge of manufacturing operations, American Bridge Co., Pittsburgh, succeeding **George M. Hunter,** who has retired after 51 years of service in the U. S. Steel Corp, subsidiary.

Mr. McDanel has been with the company at the Ambridge, Pa. plant for 36 years, having been plant superintendent since 1923.

Mr. Hunter, in 1889, began service with the Youngstown Bridge Co. and upon merger of this company into American Bridge Co. a year later, was transferred to Pittsburgh and subsequently became assistant operating manager of the Pittsburgh division. He was manager of the Youngstown plant from 1901 to 1904 and later, until 1910, assistant manager of the Ambridge plant. He was appointed manager of the Gary plant in 1910 and in 1917 was made operating manager of the Pittsburgh division. Mr. Hunter has been vice-president in charge of manufacturing operations since 1932 and is a member of the American Iron and Steel Institute.

Obituary

• **Louis E. Murphy,** formerly president and chairman of the board of E. F. Houghton & Co., Philadelphia, died of pneumonia at his summer home at Mantaloking, N. J., on June 26, aged 66 years. He had been connected with the company for 52 years. He was elected secretary of the company in 1910, vice-president four years later and president in 1929. In 1934 he was made chairman of the board and retired two years later.

• **Harold G. Pederson,** president of the Pederson Tool & Cutter Co., Milwaukee, and widely known as the inventor of Pedwyn balancers, died of a heart attack at his home there, aged 46 years. He was a native of Detroit and before going to Milwaukee five years ago was works manager for General Motors Corp. for 15 years. He was a graduate of the Ferris Institute and of Northwestern University.

• **G. F. Danielson,** an early executive of the Commercial Shearing & Stamping Co., Youngstown, died June 25 at St. Petersburg, Fla. He was 82 years old. Mr. Danielson was one of the founders of the Toledo Foundry & Machine Co., now the E. W. Bliss Co. He was associated with the Youngstown Pressed Steel Co., a subsidiary of the old Youngstown Iron & Steel Co. In 1916 the pressed steel concern became part of Sharon Steel Hoop Co. Then, for several years Mr. Danielson was with Truscon Steel Co.

When Carnick Bros. started Commercial Shearing & Stamping Co. in 1920, Mr. Danielson was the consultant in charge of the organization.

• **Harold W. Clark,** general factory manager and assistant to the president, McCaskey Register Co., Alliance, Ohio, died June 21 at Madison, Ohio. Formerly he was associated with the Buckeye Jack Co. and the Alliance Machine Co. He was 45 years old.

• **Col. Harry F. Dalton,** retired executive of the American Car & Foundry Co., who died in St. Petersburg, Fla., June 26, was a native of Salem, Mass., having been born there 68 years ago. He retired from business a few months ago. He had been identified with the company for almost 20 years.

• **John L. Jackson,** a manufacturer of machinery since 1881, died June 29 at his home in Saginaw, Mich. Mr. Jackson, born 85 years ago in Saginaw County, first made machines for the Saginaw Valley lumber industry. He was founder and president of the Jackson-Church Co., machinery manufacturer. In 1906 he founded the Jackson-Church-Wilcox Co., which became the Saginaw Steering Gear division of General Motors Corp. when GM was being formed in 1910. One of the first to recognize possibilities in Michigan oil fields, he led in the drilling of the first well in the Saginaw Valley in 1912. A former director for 23 corporations, Mr. Jackson was an organizer of the Board of Commerce and the Saginaw Manufacturers Association.

• **William V. Moore,** 58 years old, organizer and former manager of the U. S. Bridge & Pipe Co., Bay City, Mich., died June 12 after a long illness.

• **Hugh C. Thomas,** secretary of the Tinplate International Cartel, dropped dead in his office at Swansea, Wales, recently. He was 49 years old. For over 30 years Mr. Thomas was associated with the Welsh tin plate industry and 14 years ago succeeded his uncle as secretary of the Welsh Plate and Sheet Makers' Association.

Metal Working Activity

. . . Latest Data Assembled by The Iron Age

From Recognized Sources. In Net Tons.

	May 1940	April 1940	April 1939	4 Months 1940	4 Months 1939
Steel Ingots:					
Monthly output[a]	4,841,403	3,974,706	3,352,774	18,303,811	14,139,679
Average weekly output[a]	1,092,867	926,505	781,532	1,058,636	824,471
Per cent of capacity[a]	72.00	61.04	51.11	69.75	53.91
Pig Iron:					
Monthly output[b]	3,513,683	3,137,019	2,302,918	13,751,020	9,728,770
Raw Materials:					
Coke output[c]	4,349,909	4,086,747	2,934,560	17,464,005	13,034,807
Lake ore consumption[d]	5,114,144	4,407,035	3,135,741	19,660,219	13,323,191
Scrap consumption[r]	3,755,360	3,083,000	2,595,000	14,016,000	10,930,242
Castings:					
Malleable, orders[e]	35,563	35,290	29,183	146,359	136,519
Steel, orders[e]	.....	34,388	34,388	161,999	150,722
Finished Steel:					
Trackwork shipments[a]	.....	.....	6,819	.....	20,459
Fabricated shape orders[f]	117,789	67,104	118,309	372,398	397,805
Fabricated plate orders[e]	40,408	36,213	35,844	131,276	109,042
U. S. Steel Corp. shipments[g]	1,084,057	907,904	771,752	3,994,657	3,235,153
Fabricated Products:					
Automobile production[h]	391,215	432,746	337,375	1,692,677	1,354,709
Steel furniture shipments[e]	.....	$2,008,428	$1,619,218	$8,960,330	$7,165,228
Steel boiler orders[e] (sq. ft.)	1,065,958	878,259	764,996	2,731,490	3,329,637
Locomotives ordered[i]	20	50	19	136	93
Freight cars ordered[i]	2,081	1,812	2,695	4,259	5,702
Machine tool index[j]	92.5	93.4	61.2	93.2†	58.7†
Foundry equipment index[k]	.....	192.9	146.0	305.3†	142.8†
Gear sales index[s]	133	128	88	125†	95†
Non-Ferrous Metals: (U. S.)					
Lead shipments[l]	.....	46,563	37,903	171,967	153,384
Lead stocks[l]	.....	63,463	123,394	.....	.....
Zinc shipments[m]	59,177	46,978	40,641	287,533	168,399
Zinc stocks[m]	75,036	81,234	130,380	.....	.....
Tin deliveries[n] (gross tons)	7,905	7,855	5,980	19,170	33,479
Refined copper deliveries[o]	69,467	68,665	42,484	287,684	192,613
Refined copper stocks[o]	178,664	169,120	332,513	.....	.....
Exports:					
Total iron and steel[p]	.....	612,906	394,008	2,531,708	1,781,618
Rolled and finished steel[p]	.....	270,330	134,478	1,208,344	150,615
Semi-finished steel[p]	.....	96,609	8,849	362,820	9,911
Scrap[p]	.....	221,152	241,780	850,253	1,115,578
Imports:					
Total iron and steel[p]	.....	6,674	49,373	26,784	116,265
Pig iron[p]	.....	286	3,933	4,815	8,359
Rolled and finished steel[p]	.....	32,587	36,497	8,379	75,453

†Three months' average. *Not available.

Source of data: [a] American Iron and Steel Institute; [b] THE IRON AGE; [c] Bureau of Mines; [d] Lake Superior Iron Ore Association; [e] Bureau of the Census; [f] American Institute of Steel Construction; [g] United States Steel Corp.; [h] Preliminary estimates by THE IRON AGE—Final figures from Bureau of the Census, U. S. only; [i] *Railway Age;* [j] National Machine Tool Builders Association; [k] Foundry Equipment Manufacturers Association; [l] American Bureau of Metal Statistics; [m] American Zinc Institute; [n] New York Commodity Exchange; [o] Copper Institute; [p] Department of Commerce; [r] Institute of Scrap Iron and Steel; [s] American Gear Manufacturers Association.

The Iron Age Comparison of Prices

Advances Over Past Week in Heavy Type; Declines in Italics

	July 2, 1940	June 25, 1940	June 4, 1940	July 3, 1939
Flat Rolled Steel:				
(Cents Per Lb.)				
Hot rolled sheet	2.10	2.10	2.10	2.00
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.00
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Tin and Terne Plate:				
(Dollars Per Base Box)				
Tin plate	$5.00	$5.00	$5.00	$5.00
Manufacturing ternes	4.30	4.30	4.30	4.30
Bars and Shapes:				
(Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Wire and Wire Products:				
(Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.45
Rails:				
(Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel:				
(Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Wire Rods and Skelp:				
(Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	1.92
Skelp (grvd.)	1.90	1.90	1.90	1.90

	July 2, 1940	June 25, 1940	June 4, 1940	July 3, 1939
Pig Iron:				
(Per Gross Ton)				
No. 2 fdy., Philadelphia	$24.84	$24.84	$24.84	$22.84
No. 2, Valley furnace	23.00	23.00	23.00	21.00
No. 2, Southern Cin'ti	23.06	23.06	23.06	21.06
No. 2, Birmingham	19.38	19.38	19.38	17.38
No. 2, foundry, Chicago†	23.00	23.00	23.00	21.00
Basic, del'd eastern Pa.	24.34	24.34	24.34	22.34
Basic, Valley furnace	22.50	22.50	22.50	20.50
Malleable, Chicago†	23.00	23.00	23.00	21.00
Malleable, Valley	23.00	23.00	23.00	21.00
L. S. charcoal, Chicago	30.34	30.34	30.34	28.34
Ferromanganese‡	120.00	120.00	100.00	80.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton. ‡For carlots at seaboard.

Scrap:				
(Per Gross Ton)				
Heavy melting steel, P'gh.	*$19.75*	$20.25	$19.00	$15.25
Heavy melting steel, Phila.	*19.50*	20.00	19.00	15.50
Heavy melting steel, Ch'go	*17.50*	18.50	17.75	13.375
Carwheels, Chicago	19.00	19.00	19.00	12.75
Carwheels, Philadelphia	*21.75*	22.75	20.75	16.00
No. 1 cast, Pittsburgh	20.75	20.75	19.25	15.25
No. 1 cast, Philadelphia	*21.75*	22.25	20.75	16.25
No. 1 cast, Ch'go (net ton)	*16.75*	17.25	17.00	12.25
Coke, Connellsville:				
(Per Net Ton at Oven)				
Furnace coke, prompt	$4.00	$4.00	$4.00	$3.75
Foundry coke, prompt	5.25	5.25	5.25	4.75
Non-Ferrous Metals:				
(Cents per Lb. to Large Buyers)				
Copper, electro., Conn.	11.50	11.50	11.50	10.00
Copper, Lake, New York	11.50	11.50	11.50	10.00
Tin (Straits), New York	53.00	52.25	55.00	48.80
Zinc, East St. Louis	6.25	6.25	6.25	4.50
Lead, St. Louis	4.85	4.85	4.85	4.70
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	14.00

*Mine producers only.

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 113 to 116 herein. On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

Composite Prices . . .

	FINISHED STEEL	PIG IRON	SCRAP STEEL
July 4, 1940	2.261c. a Lb.	$22.61 a Gross Ton	$18.92 a Gross Ton
One week ago	2.261c. a Lb.	$22.61 a Gross Ton	$19.58 a Gross Ton
One month ago	2.261c. a Lb.	$22.61 a Gross Ton	$18.58 a Gross Ton
One year ago	2.236c. a Lb.	$20.61 a Gross Ton	$14.71 a Gross Ton

	High	Low	High	Low	High	Low
1940	2.261c., Jan. 2	2.211c., Apr. 16	.....	.....	$19.92, June 18	$16.04, Apr. 9
1939	2.286c., Jan. 3	2.236c., May 16	$22.61, Sept. 19	$20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.512c., May 17	2.211c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.512c., Mar. 9	2.249c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.92, Nov. 10
1936	2.249c., Dec. 28	2.016c., Mar. 10	19.73, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.062c., Oct. 1	2.056c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.118c., Apr. 24	1.945c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.953c., Oct. 3	1.792c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.915c., Sept. 6	1.870c., Mar. 15	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.981c., Jan. 13	1.883c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.192c., Jan. 7	1.962c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.236c., May 28	2.192c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.

Based on average for basic iron at Valley furnace and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Summary of the Week

• Defense program slowed at Washington, though industry anxiously waits to play its part . . . British buy 112,000 tons of rails in United States . . . Scrap prices sag again . . . Pig iron production gains 12 per cent in June.

THE full force of the national defense program on the steel industry is not expected to be experienced in less than 90 days. The avalanche of news from Washington regarding appropriations has evidently created public acceptance of the idea that the program is well under way, so far as industry is concerned, but this is far from the fact. The Navy program is being accelerated, but military production of arms, airplanes, etc., is still delayed in Washington notwithstanding the anxiety of manufacturers to learn what they are expected to do.

Unofficial estimates of the amount of steel that will be required for defense work range from 12,000,000 to 15,000,000 tons, probably spread over two years or more.

The 45 ships awarded under the new Navy program authorized by the Walsh-Vinson Law will require a total of 55,000 tons of steel and 11,000 tons of armor plate. An earlier award of 19 small ships calls for a total of 12,000 tons. Considerable steel will also be required for building new ship ways, shop buildings and dry docks. Two Navy dry docks to be built at Philadelphia and Norfolk will take about 20,000 tons of steel.

New appropriations of three to five billion dollars to be requested of Congress are specifically for the Army, whose program is apparently lagging behind that of the Navy so far as contracts are concerned.

THE official red tape which has slowed the placing of war contracts by the British in the United States and Canada has been severed by the decision to give full authority to the buyers in this country and in the Dominion. A move toward greater centralization of defense purchasing authority in Washington has also been made with the appointment of a purchasing coordinator to serve with the National Defense Advisory Commission.

British steel buying in the United States has been featured by the purchase of 112,000 tons of 90-lb. rails for quick shipment. The rails are to be strung along all railroads in England and Scotland to permit speedy repairs in the event of damage by bombing.

Other than British requirements, export trade has flattened out considerably. Although larger than the pre-war average, it has recently been well below the peak months of last fall and early this year. The taking over of French steel contracts has been completed by the British.

Some export shipments which were turned back because of war zone restrictions have become distress tonnage and are being offered for sale by their owners to avoid continued storage charges. When Italy entered the war nearly 60,000 tons of steel scrap was loaded on boats destined for that country. This scrap is being offered for sale by the Italian government, which had paid for it, and accounts in some measure for the pressure on scrap prices which has resulted in further declines. However, the biggest break in scrap prices, amounting to $1 a ton, took place at Chicago, where exports are not a factor. Prices are off in nearly all markets, the decline in THE IRON AGE scrap composite price being 66c. A total drop in two weeks of $1. This week's average is $18.92.

While steel ingot production has declined this week to 75 per cent owing to shutdowns for the holiday, the rate probably would have been as good or better than last week had there been no holiday. Operations will snap back next week.

JUNE bookings were generally the best for that month since 1929. Though below the high totals of last fall, they were sufficient to expand backlogs of many companies and result in longer deliveries on some products. While buyers are protecting themselves by building up larger inventories, they are in no sense being stampeded into buying abnormally large quantities. Hence current shipments represent direct consumption plus some inventory accumulation. The caution that exists seems to be predicated on an expectation that the war may end within a few months.

Railroad buying of equipment and rails promises to add to mill backlogs. Inquiries for more than 7000 cars and purchase of 1100 apparently are the beginning of a substantial move toward railroad equipment rehabilitation.

This week marks the changeover of some of the automobile plants to production of 1941 models. Buying of steel will expand as the new programs progress.

Pig iron production totaled 3,804,800 net tons (partly estimated) in June compared with 3,513,683 tons in May. The daily output of 126,800 tons last month showed a gain of nearly 12 per cent over the May daily rate of 113,345 tons. There were 181 furnaces in blast on July 1, a gain of nine in the month.

The Industrial Pace . . .

A FURTHER GAIN in general industrial activities was indicated for the past week by THE IRON AGE capital goods index, but the week's gain was considerably smaller than that shown in May and early June. The index at the close of the past week stood at 87.7, as compared with 86.1 in the preceding week, the highest since the first week of February, but still far below the 1929 high of 129.

While it is extremely doubtful that the index has as yet reached the peak (106 was recorded in one week in 1937) of the current upward movement, it is inevitable that adjustments within the various industries covered by the index, as for example the model changeover in the automobile industry, will occasionally cause the index to decline for short periods.

The steel series was again the heaviest contributor, on an adjusted basis, to the week's advance, followed by Pittsburgh and lumber factors. The week-to-week easing of automobile assemblies is paralleling the decline in the seasonal adjusting factors with remarkable accuracy. In the past week the drop in assemblies was only 0.7 points greater than the normal seasonal decrease.

One of the outstanding construction contracts announced in the past week was for a new building for the Engineering Society of Detroit and University of Michigan.

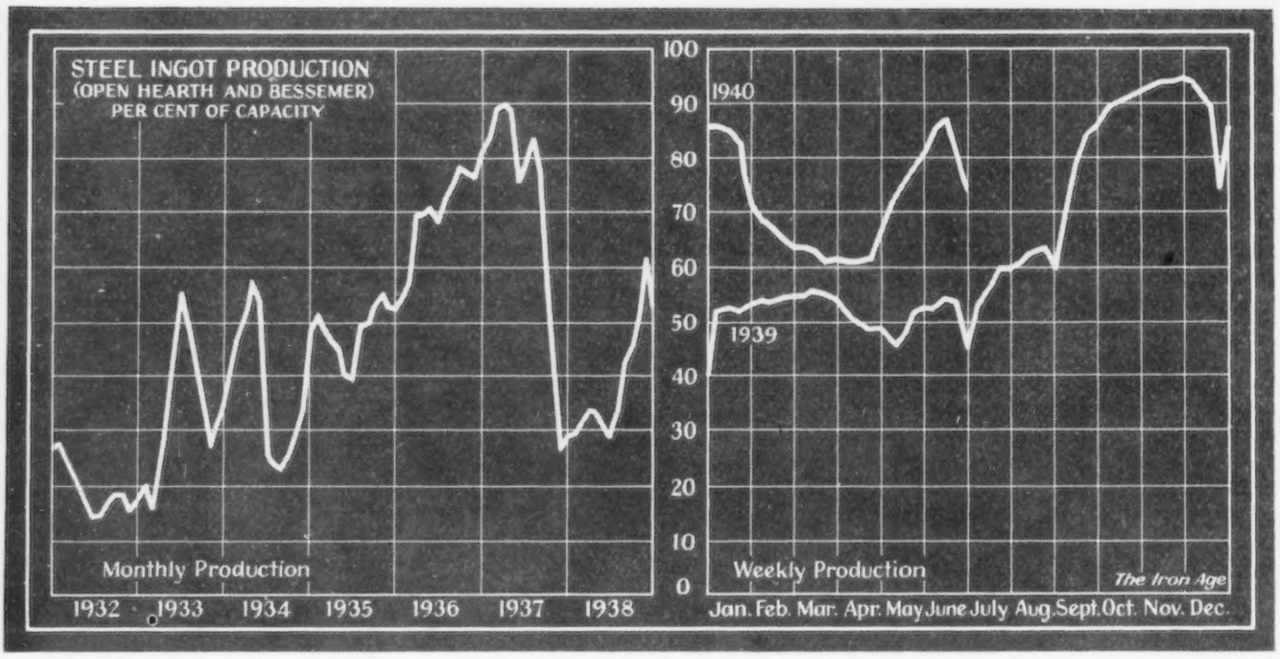
Additional cause for anticipating a continued gain in industrial activity is the gathering impetus of railroad equipment purchasing. The requirements of the railroads, always an important steel outlet, will undoubtedly find reflection in many other secondary industries.

Coinciding with the recent spurt in construction activity, as indicated by the value of contracts awarded, is the gain shown in actual orders booked by the structural steel industry. As the accompanying graph shows, structural steel business this year, except for a shortlived spurt in March, has been lagging behind the general upward march. In May, however, orders booked increased to 117,789 tons from 67,104 in April. Trade reports suggest that this upward trend held up well in June.

The heavy buying of the past few months has apparently been matched to a great extent by actual consumption, according to the virtually unchanged condition of manufacturers' inventories reported for May by the National Industrial Conference Board. The index of inventories for May was 131, compared with 130 in April. The index has been hovering around 130 all this year so far (see accompanying graph).

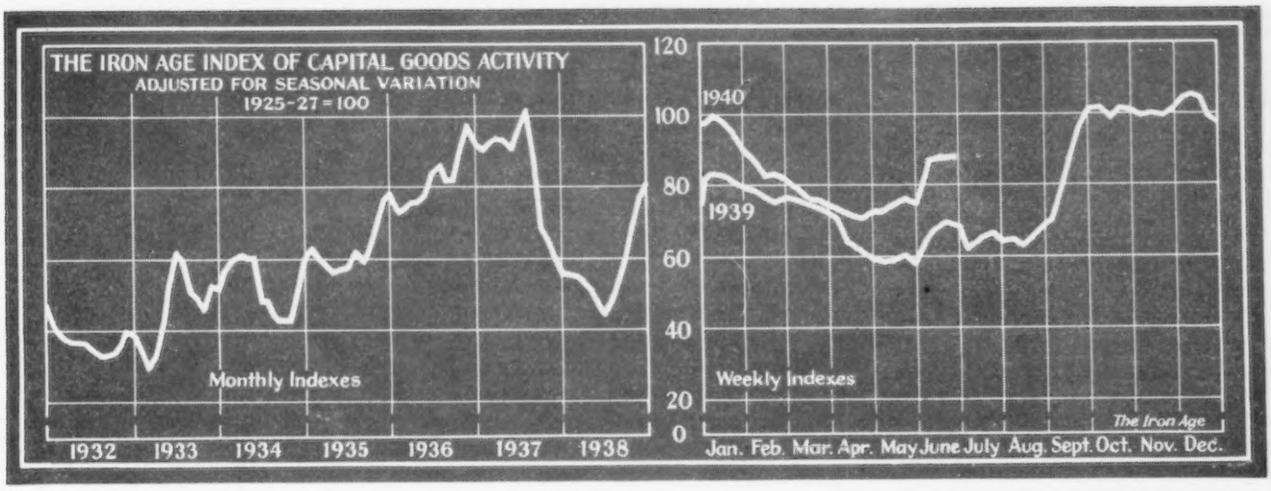
The only bearish development has been the decline in scrap prices. Upward movements of scrap prices on many occasions in the past have been temporarily interrupted by reactions such as is being experienced now.

Holiday Cuts Ingot Output to 75% of Capacity



District Ingot Production, Per Cent of Capacity		Pitts-burgh	Chicago	Valleys	Phila-delphia	Cleve-land	Buffalo	Wheel-ing	Detroit	Southern	S. Ohio River	West-ern	St. Louis	East-ern	Aggre-gate
	Current Week . .	66.0	78.5	76.0	79.0	77.0	86.5	94.0	84.0	76.5	62.5	75.0	64.0	70.0	**75.0**
	Previous Week . .	83.0	92.0	88.0	86.0	85.0	100.0	99.0	95.5	92.0	97.5	71.0	76.5	75.0	**88.0**

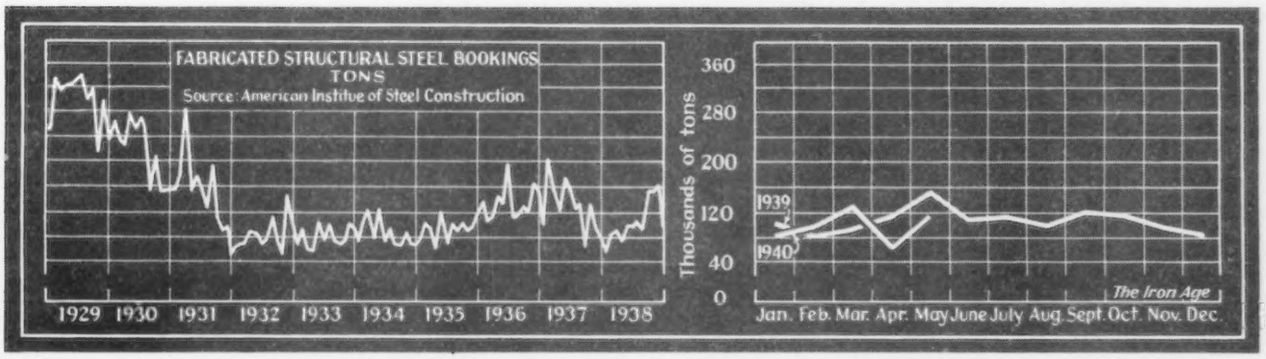
Index Continues to Rise, But at Slackened Pace



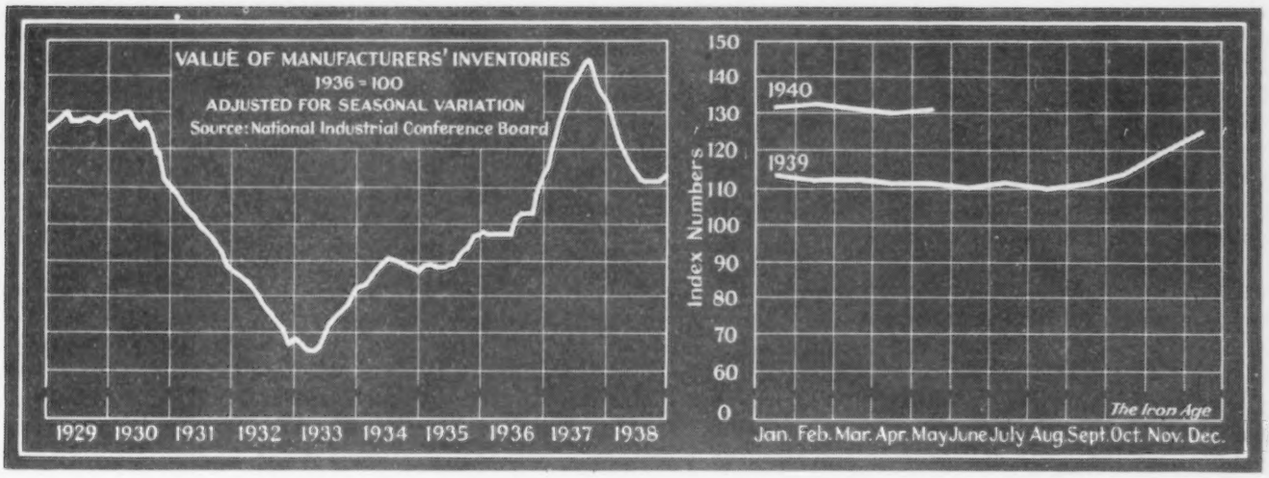
Components ↓ Week Ended →	June 29	June 22	June 1	July 1 1939	June 29 1929
Steel ingot production[1]	132.2	126.9	104.1	81.0	137.0
Automobile production[2]	81.3	82.0	66.2	65.6	135.6
Construction contracts[3]	57.8	58.6	52.9	72.1	121.8
Forest products carloadings[4]	61.9	61.2	61.4	55.3	120.7
Pittsburgh output and shipments[5]	105.4	101.8	94.4	68.7	129.9
COMBINED INDEX	87.7	86.1	75.8	68.5	129.0

Sources: [1] THE IRON AGE; [2] Wards Automotive Reports; [3] *Engineering News-Record;* [4] Association of American Railroads; [5] University of Pittsburgh. Indexes of forest products carloadings and activity in Pittsburgh area reflect conditions as of week ended June 22. Other indexes cover week of June 29.

Sharp Increase in Structural Steel Buying in May



Inventories Unaffected by Heavy Buying in May



Market News

. . . THE WEEK'S ACTIVITIES IN IRON AND STEEL

Steel Operations

. . . Holiday Shutdown Causes Rate for Industry to Decline to 75 Per Cent

Owing to steel plant shutdowns for the Fourth of July, the average production of ingots this week has declined to an estimated 75 per cent of capacity. Had it not been for the holiday, operations would have been at least as high as last week and possibly a shade better. This week's figures for individual districts are more or less meaningless in view of the fact that operations will snap right back after the holiday in most instances.

New Business

. . . June orders ran well ahead of those of May

Total new steel business received by PITTSBURGH mills during June was from 25 to 35 per cent ahead of the May volume the gain in orders on some products being even greater. Fresh bookings in certain cases continue heavy enough to support near-capacity operations and at most companies backlogs are still expanding.

Britain has taken over most of the French steel commitments and has already released a sizable tonnage for shipment. Some time will elapse before all French orders are completed, however, as many of the specifications have to be changed to meet British requirements. Orders placed by France for products not needed by England will probably be cancelled but the tonnage involved will be applied against another product with the same company.

Steel tonnages booked by CHICAGO sales offices during June have in some cases exceeded May by as much as 80 per cent. In all cases, substantial increases were reported. At this writing no indication has been seen in the Middle West of any slackening of this demand. Much of the business ordered during June was in sheets and strip, as a natural consequence of the June 30 deadline on specifications against commitments entered at $4 a ton under the regular market price. Hot rolled bars were next in importance during the month, as regards products, but their demand was occasioned by an actual current need on the part of farm implement and tractor plants, forgers, cold finishing mills and steel warehouses. With all this activity of June, but little was contributed by the automotive and railroad industries, a testimony in itself of the widespread diversification of the demand. Some orders for 1941 automobile steel are being received now at steel mills, but as yet this business has reached no large proportions. Railroad buying in the past few weeks has increased greatly. A number of large car programs are pending and there is reason to believe that many more will follow within a short time. It is also stated in railroad circles in Chicago that a large secondary rail program is to be expected.

Though new business during June in almost every instance exceeded production, backlogs have not yet had an opportunity to gain much volume. Deliveries at CHICAGO are available in four to five weeks or less of almost any standard steel product. The situation, busy, as it is, has not yet reached the point where sellers have stopped looking for new business. At one office, new business taken during June was perhaps 20 per cent greater than the tonnage shipped that month.

Those Chicago mills with French orders are still holding up production until more definite instructions have been received. Export inquiry there is lessening somewhat.

At Cleveland and Youngstown aggregate June orders were the best of any month this year, insuring an excellent outlook for July operations, which will also be supported by additional railroad buying, automotive specifications and government purchases. Although some phases of the armament program will be slow to develop, there is much work which can proceed immediately, such as building projects.

In general, operations of steel consumers in the NORTHERN OHIO area show a gain of around 10 per cent over the usual June average. Some are ahead by as much as 40 per cent. Aircraft parts makers, machine tool producers and machine shops are particularly busy. Continued high operations through the next two months appear certain.

Demand for coke continues very strong, especially from Canada. Fluorspar markets have been quite active during the past 10 days. Iron ore shipments are best since August, 1937.

By devious roundabout routes Swedish steel producers are able to offer delivery in the United States but at very high cost due to the long vessel hauls required.

Chief item of interest in the past week in the Philadelphia area was announcement of the Pennsylvania Railroad's new car program (see Railroad Buying Market for details). This program will probably involve close to 30,000 tons of steel, cast and rolled. Reading Railroad is stepping up its repair program, but no new car building is contemplated as yet.

General bookings in Philadelphia in the past week were fully equal to the previous week's level and were again in excess of shipments, adding further to backlogs. Some buyers are endeavoring to anticipate last-quarter needs, but sellers generally are discouraging this practice. Delivery periods continue to lengthen, but no serious delays are apparent yet.

The Reconstruction Finance Corp. last week approved a grant of its share of the $57,000,000 Battery tunnel in New York and work on the project is expected to get under way immediately. First contracts will be for ventilating shafts, involving very little steel. Awarding of contracts for construction of the tunnel proper, which will require

large tonnages of cast iron and steel, will probably not take place for five or six months.

Sales by NEW YORK offices in the past week have held up to the pace of previous weeks. Some companies report that June bookings were the largest for that month since June, 1929. While the volume did not reach the peek of last fall, it was substantial in all cases.

Government steel orders in the Southern Ohio district are increasing while a slight slackening in foreign demand is noticed.

The Bureau of Yards and Docks, Navy Department, is reported to be negotiating two cost-plus contracts for construction of aviation shore facilities at the Naval Air Station, San Diego, to total about $7,000,000, and for construction of an 8500-ft. breakwater, a drydock, and buildings at the Fleet Operating Base, San Pedro, Cal., totaling about $19,750,000.

Prices

. . . New lists of extras issued on structural shapes

Effective as of July 1, 1940, producers have issued a new list of extras on hot rolled carbon structural steel shapes. The outstanding change is the new setup on quantity extras where under 2000 to 1000 lb., inclusive, now take an extra of 25c. per 100 lb. and under 10,000 lb. an extra of 50c., thus eliminating the former extras on quantities over 2000 lb. These extras are determined by the total theoretical weight of an individual section ordered of one grade or analysis released for shipment at one time.

Several new intermediate size limits have been added to the list of angles taking special extras for rage and in addition new length extras and extras for special cutting have been added.

A new quality, grade A structural steel welding quality, has been added which, on sizes up to three-quarters of an inch take an extra of 10c. and over three-quarters of an inch an extra of 35c. Grade B structural steel takes the base price.

When steel is shipped in an open car a charge of $1 a ton will henceforth be charged to protect the steel with tar paper with a minimum of not less than $15 per car.

Pig Iron

. . . Shipments Advance to Best Levels of Year

Shipments in the past week have moved upward in nearly all districts to the best levels of the year, with the June volume in the PITTSBURGH area running as much as 40 per cent ahead of May, and the defense program undertaken by the government pointing to still greater activity and, sellers believe, to higher price for the metal.

Export business over the Atlantic is confined to England, and the movement to South American countries is not impressive. A feature of the market in the NEW YORK and some other districts is British ordering for low phosphorus iron.

Meanwhile the domestic melt is spotty in most areas such as CLEVELAND and new buying has eased off except in NEW ENGLAND where a slight improvement is noted.

The increase in prices in the WEST has caused little surprise since costs of items going directly and indirectly into manufacture of pig iron have advanced and higher pig iron quotations are considered likely. At PHILADELPHIA many pig iron users are buying to cover their needs through to the end of 1940. While pig iron shipments at CHICAGO were ahead of May, foundry coke shipments were little changed, and several large farm equipment plants are now shut down for a two weeks' vacation period.

Iron Ore

. . . Lake Superior Movement in June 9,525,494 Tons

Shipments of Lake Superior iron ore during June totaled 9,525,494 gross tons, including 38,674 tons of Canadian ore, according to the latest report of the Lake Superior Iron Ore Association, Cleveland. The volume was the best of any month since August, 1937, and compares with 7,274,024 tons moved in May, 1940, and 5,572,998 tons in June, 1939.

The cumulative movement up to July 1 this season was 17,268,690 tons, a gain of 8,037,458 tons over the corresponding part of the 1939 season.

The June movement was slightly below expectations. In July the coal movement will decrease, resulting a speed-up of ore deliveries.

An 8600-ton cargo of Canadian iron ore from the New Helen mine in western Ontario was unloaded last week end at the Corrigan, McKinney dock of Republic Steel Corp. in Cleveland for rail shipment to Canton, Ohio. Several more cargoes of Canadian ore will come to Cleveland this season.

Semi-Finished Steel

. . . Bookings are Heavy and Show Further Expansion

Demand for semi-finished steel at PITTSBURGH continues at a high rate, with the volume of new bookings received last week showing further expansion. Orders at one mill last week were the largest received this year. Domestic business is heavier with non-integrated mills taking large tonnages of tube rounds, skelp and sheet bars. Export orders remain at the recent lower level due to less activity on the part of neutral buyers, although releases on former French orders taken over by the British have been increased.

Merchant Bars

. . . Bookings in June Showed Substantial Gains Over May

June bookings of hot rolled bars at PITTSBURGH were well ahead of last month with incoming business continuing at a fast pace. Mill backlogs are still increasing. Delivery promises on some sizes have been further extended. British releases on former French tonnages are being received in larger volume now that details have been worked out on more of these commitments.

At most Chicago district sales offices during June hot rolled bars constituted one of the major factors in that month's improved showing as compared with May. Though sheets and strip were also in great demand during the month as the result of a June 30 deadline on receipt of specifications for low-priced sheets, bars were being ordered solely because of a high degree of activity in consuming plants. Manufacturers of farm implements and tractors, both industrial and agricultural, were the foremost buyers of bars, though forgers and steel warehouses also

contributed greatly to the total. It is believed by most sellers here that bar stocks are not being added to appreciably at present. Most of the current shipments appear to be going into direct use.

Demand for merchant bars remains strong in CLEVELAND and YOUNGSTOWN. Special forms have begun to move better than usual, the market at CLEVELAND being featured by a large order for aircraft work during the past week.

Sheets and Strip

. . . Shipments against low priced commitments may extend into August

While incoming sheet and strip tonnage at PITTSBURGH last week was about equal to the better volume of the week before, the deadline of June 30 for receipt of specifications against low priced commitments has not been strictly adhered to. There still remains a sizable tonnage to be specified by several classes of consumers, but especially the automobile makers who have not been taking much steel lately.

Some doubt is now expressed that the July 31 shipment deadline will be maintained as producers are anxious not to lose any of their business. In this event, deliveries will probably extend well into August.

As of Monday of this week, all of the major sheet producers in the Chicago district had called a halt on any further specifying against low priced sheet commitments. A large proportion of these commitments were specified and those that were not have been cancelled. At some mills in Chicago it is felt that the month of July will be ample time to roll and ship all of the sheets for which specifications have been received. Generally speaking, however, it is believed that shipments will not be completed by the end of this month but will lag over somewhat into August. All of the foregoing statements, of course, are predicated upon the assumption that foreign events and domestic conditions will continue as at present. If there is any intensification of steel demand from abroad or from this country for armament purposes where priorities may be exercised, the entire domestic peace-time steel schedule may be disrupted and dropped back considerably. New sheet business at the regular published price will be very light throughout July, though there have in the past week or so been a few orders placed at the full prices. Some few customers, seeking a positive s a f e g u a r d against mill congestion, have orders on the books for delivery in October at the price then in effect.

At Cleveland arrival of the June 30 deadline on low price specifications found rolling mills scheduled heavily through July, since most consumers specified generously against their contracts. An exception to this latter statement is the automotive industry.

Extending the deadline on the receipt of specifications on low price sheet tonnages to June 30 did not create any great bulge in the June volume in the NEW YORK area. While tonnages booked were larger than the May aggregate, they were about on a par with the April volume.

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FORMER COSTS		WYANDOTTE COSTS	
Cost to charge tank*	$12.00	Cost to charge tank	$1.22
Mon. *(Replenishing solution)*	4.00	Mon. *(Replenishing solution)*	1.51
Tue. *(Replenishing solution)*	4.00	Tue. *(Replenishing solution)*	1.51
Wed. *(Replenishing solution)*	4.00	Wed. *(Replenishing solution)*	1.51
Thur. *(Replenishing solution)*	4.00	Thur. *(Replenishing solution)*	1.51
Fri. *(Replenishing solution)*	4.00	Fri. *(Replenishing solution)*	1.51
TOTAL cost for week	$32.00	TOTAL cost for week	$8.77

**It was necessary to dump the tank at the end of each week*

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THE J·B·FORD SALES CO· WYANDOTTE MICH·

Reinforcing Bars

. . . Specifications Being Received by Mills in Good Volume

• • • **Reinforcing bar** specifications at PITTSBURGH continue to be received in good volume with no letup seen in the near future. The recently set price of 1.90c. a lb. is not being paid on all new business, although prevailing prices are close to this level.

Among reinforcing steel awards of 6800 tons are 1367 tons for a viaduct at San Rafael, Cal., and 1072 tons for a section of the Chicago subway.

New reinforcing steel projects of 6250 tons include 1300 tons at Rockaway, Long Island, for grade elimination.

Tubular Goods

. . . Sales Gained in June Over May from 10 to 25 Per Cent

Bookings of tubular goods at PITTSBURGH during June showed an increase of from 10 to 25 per cent over the May total, with gains being made in most classifications. Sales of oil country goods have improved sharply in the past 10 days while new business in standard pipe, boiler tubes and mechanical tubing continues at recent levels.

At CLEVELAND June sales were best of any month this year, the result of generous buying during the last two weeks by diversified consumers. While the line pipe market is not brisk, numerous gathering lines are being projected which in the aggregate hold promise of excellent tonnages.

Plates

. . . Bookings are Heavier . . . Railroad Tonnage to be Strong Factor

New plate bookings at PITTSBURGH continue at a high rate with heavy demand coming from the railroads, car builders and shipbuilding yards and miscellaneous sources. The volume of business last month was ahead of the May total.

Plate tonnage at CHICAGO during June was far ahead of the previous month. The chief buyers were structural and tank fabricators, railroad car shops and car builders and miscellaneous users. Several large inquiries for railroad cars are now pending in this district and more are expected over the next few weeks. A large tonnage of light plates will be required in the manufacture of these cars.

With railroad and miscellaneous buying improved, mill backlogs are extended at CLEVELAND, on both heavy and light plates. The locomotive works at Lima has been an active buyer. Anticipating the United States rearmament program, several plants long idle have been readied for production of tank parts and other military equipment.

General demand continues to expand in EASTERN PENNSYLVANIA and most of district's rolling equipment is operating, although not all of it full time. Warehouse inter-

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Investigate NOW what Torrington Spring Machines can do for YOU in stepping up production, accuracy . . . and PROFITS.

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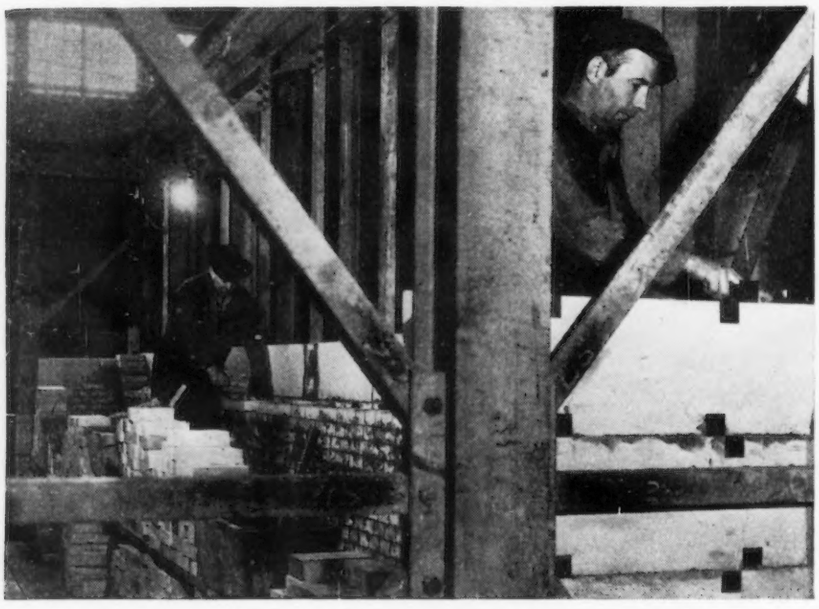
THE TORRINGTON MANUFACTURING CO. of TORRINGTON, CONNECTICUT

ests are taking more interest in future needs and fabricators are anticipating requirements in greater volume. Shipyard releases are coming through in a fairly level volume. Independent mills are able to deliver plates in from 10 days to two weeks, but larger producers require four and five weeks. New Pennsylvania Railroad car program will probably involve close to 30,000 tons of steel, mostly plates.

Bids were due to the Navy Department on July 1 on 214 50,000-gal. storage tanks for installation at Panama Canal, Hawaii and Alaska. Fabricators were given only five days in which to get bids in. Plate tonnage involved is 2900 tons. At the same time, the Quartermaster Division, War Department, called for bids on 134 50,000-gal. storage tanks, involving about 1800 tons of steel.

June was a better than average month for plate sales in the NEW YORK area. Seasonal activity on the part of the tank builders was partly responsible. Shipyard activity is at peak in that area, but is concentrated in steel company subsidiary yards.



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Railroad Buying

. . . Carriers Enter Market for Cars, Engines and Rails

The railroad equipment buying program, intimately connected with efforts to strengthen U. S. defenses, gathered momentum in the past week. Largest new program announced was the Pennsylvania's, involving 2545 freight cars and 25 locomotive tenders. Cost of this equipment was set at $10,000,000. Breakdown of proposed freight car purchases shows 1900 mill-type gondolas, 52½ ft. long; 200 mill-type gondolas, 65 ft. long; 225 covered hopper cars; 200 all-steel cabooses; 20 heavy-duty flat cars and 25 large tenders.

Another important program is the Norfolk & Western, covering 1000 hopper cars and 550 box cars. Steel, cast and rolled, required to complete the Pennsylvania and N. & W. projects, will amount to close to 50,000 tons.

Reading is planning to reconstruct 450 cars and make partial repairs to 31 locomotives and 17 passenger cars.

Largest new purchase reported during the past week was 1100 freight cars for Chesapeake & Ohio.

Sante Fe has purchased two 5400-hp. diesel electric locomotives for freight service from Electro-Motive Corp., and is seeking bids on 10 steam locomotives.

Norfolk & Western will buy 25,000 tons of rails and fastenings as part of its new improvement program. Wabash has bought 2000 tons of rails, dividing the order between Inland Steel Co. and Carnegie-Illinois Steel Corp.

Warehouse Business

. . . Sales in June Ran Moderately Ahead of Those of May

Warehouse sales at PITTSBURGH failed to keep pace with mill business during June but did show a gain of about 10 per cent over the May total. Prices on hot rolled products continue to be subject to shading.

At CLEVELAND warehouse order volume during June showed a gain over May, largely the result of a spurt in demand during the last 10 days of the month. Practically all types of consumers have been in the market. Alloy and special steels remain in very heavy demand, especially from machine tool and aircraft parts producers.

Sales in June in the PHILADELPHIA area were fully equal to the May volume, as compared with the sharp decline usually experienced in June. Demand all month was on a very broad basis, with sheets, hot rolled bars, alloy bars and specialty plates having the heaviest call. The price structure is much stronger than at the beginning of the month, but occasional weakness is still apparent in items such as galvanized sheets and pipe.

Cutting and shearing extras on hot rolled, cold finished and alloy bars have been revised, effective July 1, by a leading warehouse in NEW YORK.

Since March CHICAGO steel warehouses have been proceeding on a lateral movement on a high level, with little change in total sales from month to month.

Tin Plate

. . . Operations Reduced by Holiday but Shipments are Heavy

Tin plate operations are only 60 per cent this week owing to the holiday. Incoming specifications continue at the former level.

Wire Products

. . . Users of Manufacturers' Wire Building Up Stocks

Sale of manufacturers' wire at Pittsburgh during June were substantially over the May volume, the improvement coming from a widely diversified list of consumers who continue to send in specifications over and above actual consumption requirements in order to build up their inventories.

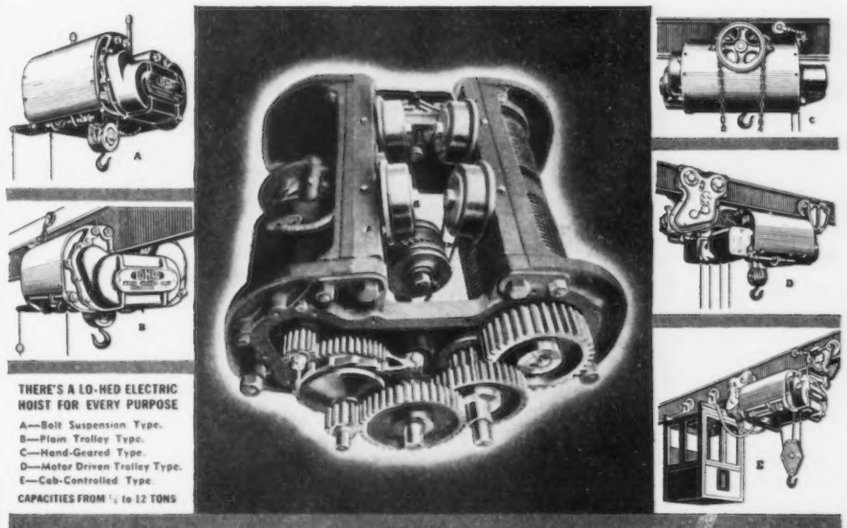
At Cleveland June sales of rods and manufacturers' wire were the best of any month this year.

Orders for both merchant wire products and manufacturers wire at Chicago during June were substantially ahead of the previous month.

Export Trade

. . . Great Britian buys 112,000 tons of 90-lb. rails here

The outstanding export purchase of the week was 112,000 tons of 90-lb. rails, which the British government ordered from American mills for quick shipment. The order was divided equally between U. S. Steel and Bethlehem.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Machine Tools

. . . SALES, INQUIRIES AND MARKET NEWS

June Sales All Time High

Chicago

• • • **Chicago machine tool dealers** are enjoying what is generally considered to be the best month in their history. One seller believes that there may have been a month back in the first World War days that equaled the present bookings but he is doubtful even of that. It is definite that the machine tool industry in this district is extremely busy. It is also obvious that a great part of the business now being placed is for military or naval production or anticipation of such orders by private industry. Yet there is at the same time, a considerable volume of private orders.

The farm equipment and tractor industries are probably the largest individual buyers of machine tools among private industry in the Middle West. In the last week or so, the International Harvester Co. has placed orders for a group of machine tools to be shipped to its tractor works in Chicago. It is understood that this plant is far behind on orders from dealers for the small tractors introduced not long ago and that production increases are contemplated. This most recent buying is believed to duplicate some of the tooling up at the outset but, if the expansion previously noted materializes, a much larger buying program will be necessary. The Oliver Farm Equipment Co., Charles City, Iowa, has also placed large orders in this district recently as it is beginning production on a new small tractor. Oliver was chiefly interested in drilling and boring machinery and some gear equipment. A list of machine tools is now being made up by the International Harvester Co. for the seven-acre addition to its East Moline, Ill., plant where small combines will be manufactured. This plant is now being erected.

Machinery for armament purposes is being ordered constantly. A great deal more of this type business is expected next month after the Rock Island Arsenal and the Chicago Ordnance Department receive their appropriations for the fiscal year beginning July 1. A number of plants in this district are engaged in production on educational orders and on actual production orders for Army and Navy units. Some shops here are working on machine tool orders which have been farmed out to them by the builders themselves. All of the latter, located in Rockford, Madison, Fond du Lac, Milwaukee and other cities in this vicinity are booked solid throughout this year and well into 1941. Deliveries in most instances are far extended. Loss of machines by individual buyers to government agencies because of priority has been reported thus far only in a very minor way. That such priority will be exercised on a larger scale shortly is expected by most of those in the machine tool trade here. It has been stated that these priorities will favor first, the machine tool industry itself, then the aircraft industry and finally the Army and Navy. The importance of the machine tool industry in an armament program of this kind to the nation and to itself is thus acknowledged by its position as the first recipient of any priority.

o o o

Allied Orders Backing Up

Cleveland

• • • **Sales during June** were exceptionally good and considerable business is still to be placed, especially machines which will be required for the United States armament program. An enormous amount of quoting has been done. Planer sales were brisk here late last week.

The past two weeks have been very difficult for most producers due to the fact machines are piling up at an embarrassing rate. The British and French have been slow to provide revised shipping instructions, resulting in serious problems at many plants. This, of course, is a temporary inconvenience.

The usual shop vacations have begun to cut into production here. One plant went down June 29 and will continue idle until July 8 except for a skeleton force. Another large producer will be down from July 15 to July 29.

o o o

Ford Buying Dropped

Cincinnati

• • • **With demand generally** following the pattern that has obtained for the past several weeks, chief interest in the machinery market was in the Republican national convention last week. News of Willkie's nomination had a lifting effect on the general attitude. Comments ranged from mere interest to very definite enthusiasm. No loss in the foreign orders on the books appeared to be reasonably certain this week, as some interests reported that French orders were now being transferred to the British. Withdrawal of the Ford Motor Co. from the aviation picture removed anticipated heavy purchasing from that source, but increased interest in possible sales to the Packard Motor Car Co. which has been reported in news items to be now considering the project heretofore up with the Ford company. Domestic ordering continues to show reasonable briskness and inquiry continues to flow into local offices. There has been no change in the backlogs, thus maintaining the extended delivery condition.

Factories in the area are still operating at capacity. The skilled labor market is just about exhausted and plants continue to press learner education.

Non-Ferrous Metals

. . . MARKET ACTIVITIES AND PRICE TRENDS

New York, July 2—Interest of non-ferrous traders is centered on problems created by the **RFC** announcement of the formation of The Metals Reserve Co. to buy 75,000 tons of tin over a period of about a year. This tin, valued at $75,000,000, is to be purchased in the open market at 50c. a lb., the announcement stated.

The lack of details in the announcement has delayed interpretations of its possible effect on domestic markets, but traders in London generally look upon it as a bullish development.

Chief question in minds of tin brokers at the moment is how such a huge tonnage can be produced. Raising of the quota, which is considered inevitable, while permitting higher output, will not assure that physical output will actually increase. Past experience has been that when the quota exceeded 100 per cent, actual output rarely reached that point. The present market price for Straits is around 53c. a lb., and if a bullish interpretation is placed upon the buying movement, it is difficult to see how the metal can be acquired in the open market at 50c. At the moment it appears that the program simply assures tin producers that this country will absorb all the tin they can produce at a minimum price of 50c. per lb.

Outside of the tin buying announcement, non-ferrous markets were a dull affair all week. Copper sales for the past week were again in the neighborhood of 10,000 tons, bringing the total for June to 111,860 tons, a figure exceeded this year only in April. Part of the dullness in the copper market was attributed to the fact that many valley mills are down for annual holidays. Prices stiffened early in the week, with 11c. done by smelters on Thursday.

The Willkie nomination, however, gave rise to better feeling in both stock markets and non-ferrous circles and caused prices to firm to 11.125c. on Friday. Mine producers continued to quote 11.50c. per lb., Connecticut Valley, all week. The export market was also very slow all week, with near-by metal this morning quoted at 10.70c. per lb.—F. A. S.

Zinc

Prime western sales in past week totaled 5901 tons, a considerable improvement over the 2058 tons sold in the preceding week. Shipments in the past week were also higher at 6595 tons against 4879 tons in the previous period.

Tin

Spottiness characterized the market again in the past week with daily sales volume fluctuating with the trend of news. Domestic consumers continued to build up stocks, but with a more cautious attitude. Quotations moved up and down during the week, in keeping with demand, but showed no definite trend. The announcement of intention of the government to buy 75,000 tons of tins, as mentioned previously, was considered by foreign traders as a bullish development, although the domestic market has not yet reacted one way or the other to the news. Cash standards in London today are priced at £262 15s.

Lead

Sales in the past week were in moderate volume, substantially below both current shipments and production. Chief interest was in August carlots. Quotations were unchanged all week at 5c. per lb., New York. Contrary to expectations, total lead stocks in May rose 3900 tons. At the end of the month, stocks were 156,192 tons.

(Non-Ferrous Prices on Page 113)

Scrap . . . MARKET ACTIVITIES AND QUOTATION TRENDS

• • • **The reaction begun** a week ago in scrap prices continues, with the composite price taking another drop, this time 66c. to $18.92, as compared with a drop of 34c. the week before. The average for No. 1, however, is still above the level of $18.58, of a month ago. There is surprisingly little activity going on, even between brokers and dealers. Biggest break took place at Chicago, where No. 1 steel is quoted off $1. No. 2 steel is down $1 at both Pittsburgh and Philadelphia, but No. 1 steel is quoted down only 50c. in both districts. Largest sale report was upward of 6000 tons of No. 2 steel to a St. Louis mill, at 50c. under last sale to the same consumer. Dealer buying prices there reacted 50c. to $1.50 early this week. Dealer buying prices are also lower by 50c. on the average at Detroit, Cincinnati and New York. Prices are nominally unchanged at Cleveland and Youngstown, in the absence of new sales. Youngstown prices had dived $3 in three weeks, following large mill sales.

Birmingham prices went up $1 on steel making grades, then subsided 50c. apparently because of some distress Italian tonnages thrown on the market from nearby Atlantic ports. Elsewhere, however, the scrap piled up in Italian boats has had no discernible effect upon the domestic market.

Youngstown

New sales into mill consumption are lacking here and shipments are being regulated at some Warren and Youngstown plants. Activity is further hampered by the advent of the monthly railroad lists. Printed quotations are unchanged this week.

Philadelphia

Both mill buyers and brokers continue to display a cautious attitude toward making new commitments and new sales are consequently light. However, on the basis of the moderate business done in the past week, a further decline of 50c. is indicated for the more important grades. This establishes No. 1 steel at $19.50, No. 2 at $18 and stove plate for steel works at $17. A second broker has entered the export market here and is currently buying for a boat, expected toward the end of July, at prices averaging $17.50 for No. 1 and $16.50 for No. 2. A small tonnage of material collected at a southern port for shipment to Italy has been offered in the past week to a district mill, but it is understood no sale has yet been effected.

Pittsburgh

Activity here has lessened considerably in the past week, with most mill buyers on the sidelines temporarily. No. 1 heavy melting steel is down another 50c. this week to $19.50 to $20, largely because of dealer transactions, with related grades down a similar amount. A recent sale of No. 2 steel into consumption reduces the quotation on this grade $1 a ton to $18 to $18.50 M.

Chicago

Late last week the Chicago market broke sharply and mill sales were made of No. 1 steel at $18, $17.75 and finally a small amount at $17.50 a gross ton. Brokers as of Tuesday this week were paying $17.50 to dealers generally, with $17.25 picking up an occasional car or two. Though sentiment as regards all items is much weaker, most of the list in the past week has been surprisingly dormant with little trading even among brokers and dealers.

Cleveland

Quotations are unchanged here this week in the absence of new transactions. Dealers are busy filling orders and are unhampered by regulations at local consuming mills, an indication that scrap is not too free here. After a slight pause due to the holiday this week, open-hearth operations hold promise of great strength during the balance of this month.

Buffalo

The market shows a pronounced but unconfirmed tendency to weakness this week. On the face of such sentiment No. 1 steel is reduced nominally 50c. to $19 to $19.50. No. 2 steel continues to be quoted at $17 to $17.50, no further sales of this item having been reported.

St. Louis

The scrap iron market declined sharply, reductions ranging from 50c. to $1.50 a ton. The break came suddenly when country dealers rushed to sell on foreign news. Dealers took enough to cover their contracts, and when offers to sell continued to pour in, cut their prices. An East Side mill bought between 5000 and 6000 tons of No. 2 heavy melting steel at a reduction of 50c. a ton for shipment over the next 60 days. Railroad lists: Pennsylvania, 19,000 tons; Chicago, Burlington & Quincy, 4000 tons; New York, Chicago & St. Louis, 1700 tons; Alton, 650 tons.

Cincinnati

With mills generally out of the market, scrap the past week tended weaker. As a result, dealers have cut all bids 50c. and their outlook seems pessimistic. Dealers' stocks are pretty extensive.

Birmingham

Prices on Nos. 1 and 2 steel shot up $1 then receded 50c., making a net gain of 50c. over last week's quotations. Dealers attribute the recession to a backwash of scrap from nearby ports, where scrap loaded for Italy was recalled and unloaded, to be disposed of at whatever price it would attract.

Detroit

Automotive lists of accumulated scrap for the month of July brought prices approximately at the same level as lists sold a month ago and did not approach the peak prices recorded in mid-June, it is learned here. The weakness of recent weeks continues and prices in the Detroit market are approximately 50c. a ton less than a week ago.

New York

Export buying prices are firm and unchanged, but the leading steel making grades are off 50c. a ton on cars for delivery to eastern Pennsylvania. A tremendous amount of material came out of hiding following the price break a week ago and thousands of tons on recent mill orders were covered within a matter of a few days. Tonnages earmarked for Italy were no factor in the break. Some of it is heading inland or is being shipped to Great Britain.

Boston

Further weakness in domestic delivery prices has cropped up and business has evaporated. Brokers apparently have few if any new orders. As compared with a week ago the market for usually active scrap classifications is 75c. to $1 a ton lower. The export market, in contrast with the domestic, is very firm. Exporters are paying $15.50 a ton delivered dock for carlots of No. 1 heavy melting steel, and $16 a ton for round tonnages. For carlots of No. 2 they pay $14 a ton on dock, and for round tonnages $14.50.

Toronto

Buying on a steadily expanding scale continues in the Canadian iron and steel scrap markets. While dealers are seeking higher prices for scrap, mills have made no indication that they will advance bid prices on new contracts.

IRON AND STEEL SCRAP PRICES

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$19.50 to $20.00
Railroad heavy mltng.	21.00 to 21.50
No. 2 heavy melting	18.00 to 18.50
Railroad scrap rails	**21.50 to 22.00**
Rails 3 ft. and under	24.50 to 25.00
Comp. sheet steel	19.50 to 20.00
Hand bundled sheets	18.50 to 19.00
Heavy steel axle turn.	18.50 to 19.00
Machine shop turnings	14.00 to 14.50
Short shov. turnings	15.50 to 16.00
Mixed bor. & turn	**11.50 to 12.00**
Cast iron borings	**11.50 to 12.00**
Cast iron carwheels	**20.50 to 21.00**
Heavy breakable cast.	16.50 to 17.00
No. 1 cupola cast	20.50 to 21.00
RR. knuckles & coup.	25.00 to 25.50
Rail coil springs	25.00 to 25.50
Rail leaf springs	25.00 to 25.50
Rolled steel wheels	25.00 to 25.50
Low phos. billet crops	**25.00 to 26.00**
Low phos. punching	**24.50 to 25.00**
Low phos. heavy plate	23.50 to 24.00
Railroad malleable	**23.50 to 24.00**

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$19.50
No. 2 hvy. mltng. steel	18.00
Hydraulic bund., new	19.50
Hydraulic bund., old	$16.00 to 16.50
Steel rails for rolling	**22.00 to 22.50**
Cast iron carwheels	21.50 to 22.00
Hvy. breakable cast	19.50 to 20.00
No. 1 cupola cast	21.50 to 22.00
Mixed yard (f'd'y) cast	18.50 to 19.00
Stove plate (steel wks.)	17.00
Railroad malleable	22.50 to 23.00
Machine shop turn	**13.00 to 13.50**
No. 1 blast furnace	12.00
Cast borings	12.00
Heavy axle turnings	17.00 to 17.50
No. 1 low phos. hvy.	24.00 to 24.50
Couplers & knuckles	24.00 to 24.50
Rolled steel wheels	24.00 to 24.50
Steel axles	23.00 to 23.50
Shafting	24.50 to 25.00
Spec. iron & steel pipe	17.00 to 17.50
Cast borings (chem.)	**14.00 to 14.50**

CHICAGO

Delivered to Chicago district consumers:

	Per Gross Ton
Hvy. mltng. steel	$17.50
Auto. hvy. mltng. steel alloy free	**16.50 to 17.00**
No. 2 auto steel	14.25 to 14.75
Shoveling steel	17.50
Factory bundles	17.00 to 17.50
Dealers' bundles	15.50 to 16.00
No. 1 busheling	16.50 to 17.00
No. 2 busheling, old	**8.00 to 8.50**
Rolled carwheels	20.00 to 20.50
Railroad tires, cut	**21.00 to 21.50**
Railroad leaf springs	18.50 to 19.00
Steel coup. & knuckles	20.00 to 20.50
Axle turnings	16.25 to 16.75
Coil springs	22.00 to 22.50
Axle turn. (elec.)	17.75 to 18.25
Low phos. punchings	20.00 to 20.50
Low phos. plates 12 in. and under	**20.50 to 21.00**
Cast iron borings	10.50 to 11.00
Short shov. turn	**12.50 to 13.00**
Machine shop turn	**12.50 to 13.00**
Rerolling rails	22.00 to 22.50
Steel rails under 3 ft.	19.75 to 20.25
Steel rails under 2 ft.	21.00 to 21.50
Angle bars steel	**20.00 to 20.50**
Cast iron carwheels	**18.75 to 19.25**
Railroad malleable	22.00 to 22.50
Agric. malleable	**14.75 to 15.25**
	Per Net Ton
Iron car axles	**23.50 to 24.00**
Steel car axles	**22.50 to 23.00**
Locomotive tires	**15.00 to 15.50**
Pipes and flues	**11.50 to 12.00**
No. 1 machinery cast	16.50 to 17.00
Clean auto. blocks	17.50 to 18.00
No. 1 railroad cast	**15.00 to 15.50**
No. 1 agric. cast	**13.50 to 14.00**
Stove plate	11.50 to 12.00
Grate bars	12.50 to 13.00
Brake shoes	12.50 to 13.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$20.00 to $20.50
No. 2 hvy. mltng. steel	19.00 to 19.50
Low phos. plate	21.50 to 22.00
No. 1 busheling	19.25 to 19.75
Hydraulic bundles	19.50 to 20.00
Machine shop turn	13.50 to 14.00

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$19.50 to $20.00
No. 2 hvy. mltng. steel	18.50 to 19.00
Comp. sheet steel	$19.00 to $19.50
Light bund. stampings	15.50 to 16.00
Drop forge flashings	18.25 to 18.75
Machine shop turn	13.00 to 13.50
Short shov. turn	13.50 to 14.00
No. 1 busheling	19.00 to 19.50
Steel axle turnings	18.25 to 18.75
Low phos. billet and bloom crops	**24.50 to 25.00**
Cast iron borings	13.00 to 13.50
Mixed bor. & turn	13.00 to 13.50
No. 2 busheling	13.00 to 13.50
No. 1 cupola cast	21.00 to 21.50
Railroad grate bars	15.00 to 15.50
Stove plate	15.00 to 15.50
Rails under 3 ft.	24.50 to 25.00
Rails for rolling	23.50 to 24.00
Railroad malleable	22.50 to 23.00

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$19.00 to $19.50
No. 2 hvy. mltng. steel	17.00 to 17.50
Scrap rails	22.00 to 22.50
New hvy. b'ndled sheets	17.00 to 17.50
Old hydraul. bundles	15.50 to 16.00
Drop forge flashings	17.00 to 17.50
No. 1 busheling	17.00 to 17.50
Machine shop turn	**11.50 to 12.50**
Shov. turnings	13.00 to 13.50
Mixed bor. & turn	11.50 to 12.00
Cast iron borings	11.50 to 12.00
Knuckles & couplers	23.00 to 24.00
Coil & leaf springs	23.00 to 24.00
Rolled steel wheels	23.00 to 24.00
No. 1 machinery cast	**20.00 to 20.50**
No. 1 cupola cast	**18.50 to 19.00**
Stove plate	16.00 to 16.50
Steel rails under 3 ft.	24.00 to 25.00
Cast iron carwheels	18.50 to 20.00
Railroad malleable	23.00 to 23.50

ST. LOUIS

Dealers' buying prices per gross ton delivered to consumer:

Selected hvy. melting	$16.25 to $16.75
No. 1 hvy. melting	15.75 to 16.25
No. 2 hvy. melting	15.00 to 15.50
No. 1 locomotive tires	18.00 to 18.50
Misc. stand. sec. rails	19.00 to 19.50
Railroad springs	19.00 to 19.50
Bundled sheets	11.00 to 11.50
Cast bor. & turn	8.00 to 8.50
Machine shop turn	9.50 to 10.00
Heavy turnings	13.00 to 13.50
Rails for rolling	20.00 to 20.50
Steel car axles	21.00 to 21.50
No. 1 RR. wrought	13.50 to 14.00
No. 2 RR. wrought	15.00 to 15.50
Steel rails under 3 ft.	20.50 to 21.00
Steel angle bars	18.50 to 19.00
Cast iron carwheels	19.00 to 19.50
No. 1 machinery cast	19.00 to 19.50
Railroad malleable	19.00 to 19.50
Breakable cast	17.00 to 17.50
Stove plate	11.00 to 11.50
Grate bars	14.50 to 15.00
Brake shoes	13.00 to 13.50

CINCINNATI

Dealers' buying prices per gross ton at yards:

No. 1 hvy. mltng. steel	$15.00 to $15.50
No. 2 hvy. mltng. steel	13.50 to 14.00
Scrap rails for mltng.	20.50 to 21.00
Loose sheet clippings	9.75 to 10.25
Hydrau. b'ndled sheets	14.25 to 14.75
Cast iron borings	6.50 to 7.00
Machine shop turn	7.50 to 8.00
No. 1 busheling	11.00 to 11.50
No. 2 busheling	5.25 to 5.75
Rails for rolling	22.00 to 22.50
No. 1 locomotive tires	16.50 to 17.00
Short rails	22.50 to 23.00
Cast iron carwheels	16.50 to 17.00
No. 1 machinery cast	19.00 to 19.50
No. 1 railroad cast	17.50 to 18.00
Burnt cast	11.00 to 11.50
Stove plates	11.00 to 11.50
Agricul. malleable	15.50 to 16.00
Railroad malleable	18.50 to 19.00
Mixed hvy. cast	16.25 to 16.75

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting steel	$16.50
No. 2 hvy. melting steel	15.50
No. 1 busheling	**14.00**
Scrap steel rails	**15.00**
Steel rails under 3 ft.	17.50
Rails for rolling	17.50
Long turnings	**5.00**
Cast iron borings	**7.50**
Stove plate	11.00
Steel axles	**13.00**
No. 1 RR wrought	**14.00**
No. 1 cast	16.00
No. 2 cast	**12.50**
Cast iron carwheels	**13.00**
Steel car wheels	**16.00**

DETROIT

Dealers' buying prices per gross ton, f.o.b. cars:

No. 1 heavy melting	$15.00 to $15.50
No. 2 heavy melting	14.00 to 14.50
Borings and turnings	10.50 to 11.00
Long turnings	10.00 to 10.50
Short shov. turnings	11.00 to 11.50
No. 1 cast	19.50 to 20.00
Automotive cast	19.50 to 20.00
Hvy. breakable cast	16.00 to 16.50
Stove plate	12.50 to 13.00
Hydraul. Comp. sheets	17.00 to 17.50
New busheling	15.50 to 16.00
Sheet clips	14.00 to 14.50
Flashings	15.00 to 15.50
Low phos. plate	18.00 to 18.50

NEW YORK

Dealers' buying prices per gross ton on cars:

No. 1 hvy. mltng. steel	$14.50 to $15.00
No. 2 hvy. mltng. steel	13.00 to 13.50
Hvy. breakable cast	15.00 to 15.50
No. 1 machinery cast	17.50 to 18.00
No. 2 cast	15.00 to 15.50
Stove plate	12.50 to 13.00
Steel car axles	20.00 to 20.50
Shafting	20.00 to 20.50
No. 1 RR. wrought	**14.50 to 15.50**
No. 1 wrought long	**13.00 to 13.50**
Spec. iron & steel pipe	12.00 to 12.50
Rails for rolling	16.50 to 17.50
Clean steel turnings*	8.50 to 9.00
Cast borings*	8.50 to 9.00
No. 1 blast furnace	8.50 to 9.00
Cast borings (chem.)	**10.00 to 11.00**
Unprepared yard scrap	8.50 to 9.00
Light iron	6.50 to 7.00
Per gross ton delivered local foundries:	
No. 1 machin. cast	$19.00 to $20.00
No. 2 cast	18.00 to 18.50

* **$1.50 less for truck loads.**

BOSTON

Dealers' buying prices per gross ton:

Breakable cast	$14.00 to $14.25
Machine shop turn	7.15 to 7.50
Mixed bor. & turn	6.00 to 6.25
Bun. skeleton long	11.25 to 11.50
Shafting	18.50 to 18.75
Stove plate	11.00 to 11.25
Cast bor. chemical	8.00 to 8.50
Per gross ton delivered consumers' yards:	
Textile cast	$17.00 to $19.00
No. 1 machine cast	17.00 to 19.00
Per gross ton delivered dealers' yards:	
No. 1 hvy. mltng. steel	$14.25 to $14.50
No. 2 steel	13.25 to 13.50

PACIFIC COAST

Per net ton delivered to consumer:

	San Fran.	Los Ang.	Seattle
No. 1 hvy. mltng. steel	$13.00	$13.00	$14.00
No. 2 hvy. mltng. steel	12.00	12.00	13.00
Bundles	11.00	11.00	12.00

CANADA

Dealers' buying prices at these yards, per gross ton:

	Toronto	Montreal
Low phos. steel	$11.50	$11.00
No. 1 hvy. mltng. steel	11.25	10.75
No. 2 hvy. mltng. steel	10.00	9.50
Mixed dealers steel	8.75	8.25
Drop forge flashings	9.75	9.25
New loose clippings	8.75	8.25
Busheling	6.00	5.50
Scrap pipe	7.75	7.25
Steel turnings	7.25	6.75
Cast borings	6.75	6.25
Machinery cast	20.00	19.00
Dealers' cast	19.00	18.00
Stove plate	14.00	13.00

EXPORT

Dealers' buying prices per gross ton:

New York, truck lots, delivered, barges	
No. 1 hvy. mltng. steel	$15.50 to $16.00
No. 2 hvy. mltng. steel	14.00 to 14.50
No. 2 cast	14.00
Stove plate	12.25 to 12.50
Boston on cars at Army Base or Mystic Wharf	
No. 1 hvy. mltng. steel	$15.50 to $16.00
No. 2 hvy. mltng. steel	14.00 to 14.50
Rail (scrap)	15.50 to 16.00
Stove plate	12.25 to 12.50
Philadelphia, delivered alongside boats, Port Richmond	
No. 1 hvy. mltng. steel	$17.50
No. 2 hvy. mltng. steel	16.50

Construction Steel

. . .STRUCTURAL STEEL, REINFORCING BARS, PLATES, PILING, ETC.

Fabricated Steel

Lettings decline to 11,750 tons from 14,900 tons last week; new projects at 15,300 tons also lower; plate awards call for 1765 tons.

AWARDS

NORTH ATLANTIC STATES

1100 Tons, Reading, Pa., building for Carpenter Steel Co., to Bethlehem Steel Co., Bethlehem, Pa.

650 Tons, Arnold, Pa., extension to building No. 242 for Aluminum Co. of America, to American Bridge Co., Pittsburgh.

360 Tons, Wilton, Conn., viaduct, route U. S. 7, to American Bridge Co., Pittsburgh.

260 Tons, Pottstown, Pa., building for Jacobs Aircraft Engine Co., to Bethlehem Steel Co., Bethlehem, Pa.

160 Tons, Chelmsford-Lowell, Mass., State bridge, to American Bridge Co., Pittsburgh; B. Perini & Sons, Inc., Framingham, Mass., contractor.

155 Tons, York, Pa., factory building for York Safe & Lock Co., to Pittsburgh Bridge & Iron Co., Pittsburgh.

140 Tons, Vineland, N. J., armory, to Ornamental Iron Works, Trenton, N. J.

130 Tons, Philadelphia, repairs to bridge No. 11/46 over Broad Street for Central Railroad Co. of New Jersey, to American Bridge Co., Pittsburgh.

125 Tons, Elizabeth, N. J., Central Railroad of New Jersey bridge repairs, to American Bridge Co., Pittsburgh.

125 Tons, Niagara Falls, N. Y., Mathieson Alkali Co. buildings, to R. S. McMannus Steel Construction Co., Buffalo.

115 Tons, Washington, Mount Vernon Memorial highway bridge, to American Bridge Co., Pittsburgh.

110 Tons, Neville Island, Pa., Bear Trap repair parts, Locks Nos. 12 and 13, Ohio River, for U. S. Engineers Office, to Hunter Steel Co., Pittsburgh.

THE SOUTH

2415 Tons, Narrows, Va., extension to Celanese Corp. plant, to Virginia Bridge Co., Pittsburgh.

535 Tons, Bulloch and Screven Counties, Ga., bridge, to Virginia Bridge Co., Roanoke, Va.

265 Tons, Hennessey, Okla., State bridge, to Tulsa Boiler & Machinery Co., Tulsa.

260 Tons, Cocoa, Fla., State highway swing span project, to Nashville Bridge Co., Nashville, Tenn.

155 Tons, Lexington, Va., dormitory and library, Washington and Lee University, to Virginia Bridge Co., Roanoke, Va.

145 Tons, Lexington, Ky., housing project, to International Steel Co., Evansville, Ind.

110 Tons, Millington, Tenn., bridge, for Illinois Central System, to American Bridge Co., Pittsburgh.

CENTRAL STATES

454 Tons, Chicago, Chicago Subway, continuation S-1-A, to Bethlehem Steel Co., Bethlehem, Pa.

340 Tons, Powerton, Ill., State bridge SA-10-A, section 10-1F, to Clinton Bridge Works, Clinton, Iowa.

300 Tons, Chicago, building for Marshall Field Estate, to Midland Structural Steel Co., Cicero, Ill.

260 Tons, Detroit, extension to office buildings for Michigan Bell Telephone Co., to Whitehead & Kales Co., Detroit.

250 Tons, Kansas City, Kan., beef house for Armour & Co., to Kansas City Structural Steel Co., Kansas City.

250 Tons, Chicago, Douglas elementary school, to New City Iron Works, Chicago.

235 Tons, Freeport, Ill., transmission towers for Illinois Northern Utilities Co., to Aermotor Co., Chicago.

200 Tons, Jackson County, Mo., bridge FA-352-D (1), to Omaha Steel Works, Omaha, Neb.

160 Tons, Detroit, warehouse, for Detroit Gasket & Mfg. Co., to Gabriel Steel Co., Detroit.

140 Tons, Pearl City, Ill., State bridge FAS-37-A, to Clinton Bridge Works, Clinton, Iowa.

115 Tons, Indianapolis, factory building for Marmon-Herrington Co., to Central States Bridge & Structural Co., Indianapolis.

WESTERN STATES

650 Tons, Berkeley, Cal., University of California administration building, to Judson-Pacific Co., San Francisco, through K. E. Parker, San Francisco, contractor.

475 Tons, Rock Springs, Wyo., overcrossing and pedestrian undercrossing, to American Bridge Co., Denver.

290 Tons, Yakima, Wash., J. M. Perry Memorial Trade School, to Isaacson Iron Works, Seattle, through Howard S. Wright Co., Seattle, contractor.

200 Tons, Redding, Cal., trestle, to Columbia Steel Co., San Francisco.

147 Tons, Glendale, Cal., Louise Street Bridge, to Consolidated Steel Corp., Los Angeles.

PENDING STRUCTURAL PROJECTS

NORTH ATLANTIC STATES

800 Tons, Stamford, Conn., power station extension for Connecticut Power Co.

550 Tons, Lockport, N. Y., building extension for General Motors Corp., Harrison Radiator Division.

525 Tons, New York, apartment house for Shroder & Koppel Corp.

500 Tons, Philadelphia, two highway bridges.

350 Tons, New York, building alterations for Consolidated Edison Co.

300 Tons, Rochester, N. Y., Strong Hospital building for Rochester University.

275 Tons, Philadelphia, post office addition.

250 Tons, Syracuse, N. Y., building for National Biscuit Co.

250 Tons, Philadelphia, building for Rohm & Haas.

200 Tons, Rehobeth, Md., bascule bridge.

200 Tons, Smethport, Pa., McKean County court house addition.

180 Tons, New York, office building alterations for Insurance Co. of North America.

140 Tons, Chicopee Falls, Mass., Government central heating plant.

130 Tons, Pittsburgh, building additions for Mine Safety Appliance Co.

THE SOUTH

1200 Tons, Beaumont, Tex., bridge for Kansas City Southern Railway Co.

400 Tons, Langley Field, Va., airplane landing mats for U. S. Govt.

135 Tons, Richmond, Va., repairs to viaduct for Chesapeake & Ohio Railway Co.

CENTRAL STATES

4000 Tons, Savanna, Ill., 44 ammunition magazines for Government.

1000 Tons, Chillicothe, Ohio, mill buildings for Mead Corp.

350 Tons, State of Wisconsin, five highway bridges; bids by State Highway Commission, Madison, July 9.

250 Tons, Smithville, Minn., State bridge No. 5866.

225 Tons, Detroit, State grade separation bridge.

125 Tons, Wadhams, Mich., State bridge.

110 Tons, Cleveland, office and warehouse for Kraft Cheese Co.

WESTERN STATES

2200 Tons, Los Angeles, buildings for Aluminum Co. of America.

325 Tons, Denver, A. C. Photo and Clerical School for Government.

150 Tons, Ogden, Utah, Weber River State bridge.

140 Tons, Hot Springs, Utah, State bridge; bids July 2.

Unstated tonnage, Odair, Wash., 150-ton gantry crane; bids July 23.

FABRICATED PLATES

AWARDS

1500 Tons, West Roxbury, Mass., water pipe, to Walsh Holyoke Steam Boiler Works Inc., Holyoke, Mass.

140 Tons, Washington, 31½-in. pipe for District of Columbia, to Maryland Culvert & Pipe Co., Baltimore.

125 Tons, Paulsboro, N. J., tanks for Patterson Oil Terminals, to Chicago Bridge & Iron Co., Chicago.

SHEET PILING

AWARDS

2000 Tons, Chicago, subway section S1A, to Bethlehem Steel Co., Bethlehem, Pa., through Paschen Brothers Construction Co., Chicago.

188 Tons, Stafford, Ariz., State bridge, to Bethlehem Steel Co., Bethlehem, Pa.

PENDING PROJECTS

1400 Tons, Peoria, Ill., Harvard Street bridge, Great Lakes Dredge & Dock Co., Chicago, low bidder.

900 Tons, Chicago, Chicago River control work; bids postponed to July 18.

Weekly Bookings of Construction Steel

Week Ended →	July 2, 1940	June 25, 1940	June 4, 1940	July 3, 1939	Year to Date 1940	Year to Date 1939
Fabricated structural steel awards	11,750	14,900	16,600	21,250	390,330	510,925
Fabricated plate awards	1,765	105	5,005	2,380	71,255	93,160
Steel sheet piling awards	2,190	485	0	0	21,315	32,755
Reinforcing bar awards	6,800	6,350	9,450	9,800	223,550	253,270
Total Letting of Construction Steel	22,505	21,840	31,055	33,430	706,450	890,110

Reinforcing Steel

Awards of 6800 tons; 6250 tons in new projects

AWARDS

ATLANTIC STATES

700 Tons, Brooklyn, factory for E. R. Squibb Co., to Bethlehem Steel Co., Bethlehem, Pa., through Turner Construction Co., contractor.

500 Tons, Johnstown, Pa., flood control project, unit No. 4, to Bethlehem Steel Co., Bethlehem, Pa., through Leo Butler & Son, contractors.

480 Tons, Passaic, N. J., bridge, route 25, section 30-C, to Jones & Laughlin Steel Corp., Pittsburgh.

274 Tons, New York, hangar No. 8 at North Beach airport, to Truscon Steel Co., Youngstown, through James Stewart & Co.

150 Tons, Portsmouth, N. H., State bridge, to Bethlehem Steel Co., Bethlehem, Pa. Lane Construction Co., Meridan, Conn., contractor.

140 Tons, Danvers, Mass., State bridge, to Northern Steel Co., Boston.

130 Tons, Chelmsford, Mass., State bridge, to Northern Steel Co., Boston; Lane Construction Co., Meriden, Conn., contractor.

125 Tons, Auburn, N. Y., prison cell blocks, to Joseph T. Ryerson & Son, Inc., Chicago.

CENTRAL STATES

1072 Tons, Chicago, subway section D6E, to Ceco Steel Products Co., Omaha, through M. J. Boyle & Co., Chicago.

650 Tons, Detroit, Charles Street housing project, to Ceco Steel Products Co., Omaha, through Consolidated Construction Co., Chicago.

167 Tons, Indianapolis, Indiana Water Co. plant, to Joseph T. Ryerson & Son, Inc., Chicago, through Service Construction Co., Indianapolis.

166 Tons, Kansas City, Mo., meat house for Armour & Co., to Truscon Steel Co., Youngstown, through Swenson Construction Co.

136 Tons, Mound City, Ill., U. S. Engineers projects, to Bethlehem Steel Co., Bethlehem, Pa., through Regenhart & Southern.

100 Tons, Bloomfield Hills, Mich., museum and library, to Great Lakes Steel Corp., through McRae Steel Co., Detroit, contractor.

Unstated Tonnage, Detroit, grade separation, Ford and Miller Roads, to Bethlehem Steel Co., Bethlehem, Pa., through Jutton Kelly.

WESTERN STATES

1367 Tons, San Rafael, Cal., State viaduct, to Truscon Steel Co., San Francisco, through Heafy-Moore Co. and Fredrickson & Watson Co., contractors.

185 Tons, Oakland, Cal., grain elevator, to Bethlehem Steel Co., San Francisco.

160 Tons, Marysville, Cal., Honcut Creek bridges, to Kyle & Co., Fresno, Cal., through Engineers Ltd., San Francisco, and Parish Brothers, Yreka, Cal., contractors.

157 Tons, San Francisco, Holy Names Parochial School, to Ceco Steel Products Co., San Francisco, through Anderson & Ringrose, San Francisco, contractor.

100 Tons, Oakland, Cal., Piedmont Avenue School, to W. C. Hauck & Co., San Francisco, through P. Sartorio, San Francisco, contractor.

PENDING REINFORCING BAR PROJECTS

ATLANTIC STATES

1300 Tons, Rockaway, Long Island, grade elimination, contract No. 4; bids taken.

630 Tons, New York, bridge, Triborough Bridge Authority; bids taken.

600 Tons, Dundalk, Md., warehouse for Frankfort Distillery Co.; bids July 3.

500 Tons, Chicopee, Mass., pumping station and dyke wall.

165 Tons, Lynnfield-Wakefield, Mass., State road and bridge, C. Bianchi Co., Boston, contractors.

CENTRAL STATES

380 Tons, Chicago, Manheim Road bridge over Milwaukee Road; bids July 25.

250 Tons, Chicago, Fullerton Avenue bridge; bids taken July 2.

230 Tons, Topeka, Kan., Treasury Department Procurement Invitation No. 5780.

200 Tons, Chicago, building for Campbell Soup Co.; bids taken.

140 Tons, Minneapolis, Standard Grocery Co. building.

125 Tons, Chicago, guide walls, Marseilles, for U. S. Engineer; bids taken.

102 Tons, Carter County, Ky., highway project FAS-292-C; letting July 12.

100 Tons, Fort Wayne, Ind., building for Coca-Cola Co.

100 Tons, St. Louis, Maple Avenue viaduct.

WESTERN STATES

400 Tons, Berkeley, Cal., University of California administration building; K. E. Parker, San Francisco, contractor.

225 Tons, Alameda, Cal., Labor Board building, recreation building, and officers' quarters at Naval Air Station (Specification 9595); Moore & Roberts, San Francisco, contractors.

150 Tons, San Rafael, Cal., Alpine Dam enlargement; bids July 29.

145 Tons, Alameda, Cal., operations building at Naval Air Station (Specification 8620); Martinelli Construction Co., San Francisco, contractor.

CANAL ZONE

500 Tons, Coco Solo, Canal Zone, apartment buildings; McCarthy Construction Co., contractor.

Cast Iron Pipe

Oakville, Conn., has plans for a water supply system to cost approximately $300,000. Bronson E. Lockwood, Litchfield Road, Watertown, Conn., is engineer, and Buck & Buck, 650 Main Street, Hartford, are consulting engineers.

Water Bureau, Atlanta, Ga., W. Zode Smith, general manager, plans pipe line for water supply to Hapeville, about eight miles, using 30 to 36-in. pipe, where service will be furnished on basis of 10,000,000 gal. per month. Project will include new filtration plant at main pumping station on Chattahoochee River, and three or four water storage tanks at Hapeville, each with capacity of 500,000 gal. Cost close to $2,000,000.

Gladewater, Tex., plans pipe line extensions and replacements in water system. Surveys and estimates of cost are being made by Albert C. Moore & Co., Smith-Young Tower Building, San Antonio, Tex.

Falls City, Neb., has accepted proposal of Layne-Western Co., 1010 West Thirty-ninth Street, Kansas City, Mo., for water system, to include about 13 miles of pipe lines for distribution, deep-well pumping station and other waterworks installation. Cost about $325,000.

Walnut Ridge, Ark., plans pipe lines for water system and other waterworks installation. Cost close to $30,000. M. L. Crist, Little Rock, Ark., is consulting engineer.

Board of Public Works, West Allis, Wis., has rejected bids recently received for cast iron water pipe and fittings, and will make purchase in open market. A. L. Wichner is superintendent of water department.

Raleigh, N. C., plans pipe line extensions in water system, including about 6192 ft. of 12-in. pipe for main service in part of Fairview Road, and 1200 ft. of 8-in., with smaller lines. Cost close to $50,000, including 48-in. storm sewer line near viaduct. Fund of $29,192 has been secured through Federal aid, remainder of appropriation to be furnished by city. C. L. Barnhardt is city engineer.

Ague Dulce, Tex., plans pipe lines for water system and other waterworks installation. Cost about $40,000. M. C. St. John, 4101 Polk Avenue, Houston, Tex., is consulting engineer.

Whittier, Cal., has awarded 125 tons of 6-in. pipe to United States Pipe & Foundry Co., San Francisco.

Sumner, Wash., has taken bids on 150 tons of 14-in. pipe.

Pipe Lines

Southern Gas Corp., Longview, Tex., plans new 16-in. welded steel pipe line from natural gas field district to city, about 27 miles, for gas transmission for local distribution. Also will install complete pressure pipe line system in municipality, with meter and control station, and other operating facilities. A booster station will be built for main line service. Entire project will cost over $300,000.

Beaumont, Tex., is completing surveys and estimates of cost for new municipal steel pipe system for natural gas distribution, totaling about 200 miles of 16-in. for main transmission lines to 4-in. for distributing system. Also will install control house and meter station and other operating facilities, including about 14,000 meters for consumers. Albert C. Moore & Co., Smith-Young Tower Building, San Antonio, Tex., are consulting engineers.

Bureau of Reclamation, Denver, has let contract to Western Pipe & Steel Co., Los Angeles, at $47,875, f.o.b. Los Angeles, for two 72-in. welded plate steel pipe lines, with 57-in. downstream branches, similar pipe, for outlet works at Deer Creek dam, Provo River project, Utah (Specifications 1363-D).

Pacific Gas & Electric Co., 245 Market Street, San Francisco, plans welded steel pipe under Oakland Estuary, Oakland inner harbor, for natural gas transmission, connecting with main pipe line system at Oakland. Cost close to $100,000.

Independent Natural Gas Co., subsidiary of Phillips Petroleum Co., Bartlesville, Okla., plans new welded steel pipe line from Sherman County, Tex., gas field, in Texas Panhandle area, to Milwaukee and vicinity, about 877 miles, for natural gas transmission. Parent company has large acreage of gas wells in district noted, with estimated reserves of close to 4,000,000,000,000 cu. ft. of natural gas. New line will pass through parts of Texas, Oklahoma, Kansas, Missouri, Iowa, Illinois and Wisconsin, and rights of way are being secured. Lateral lines will be built at points along route for connection with pipe line systems of gas utility companies in different municipalities, which will handle local distribution, as well as branch lines and operating facilities for large industrial consumers. At terminus, company proposes to deliver natural gas at wholesale to several utility companies in Wisconsin, which will use for service through own lines in various municipalities. Entire project is estimated to cost $26,698,000 with booster stations, control and meter houses and other operating structures. Financing is being arranged through a stock and security issue totaling $30,000,000.

Northern Natural Gas Co., Twenty-eighth Street and Chandler Road, Omaha, Neb., has let contract to Charles S. Foreman Co., New York Life Building, Kansas City, Mo., for new 10¾-in. welded steel pipe line from Boone to Ames, Iowa, about 22 miles, for natural gas transmission for distribution at latter place. Cost over $100,000.

Iowa Public Service Co., Waterloo, Iowa, plans about 14,000 ft. of 6-in. for extensions in gas distribution system. It is proposed to use cast iron pressure pipe.

North Western Utilities, Ltd., Edmonton, Alta., plans welded steel pipe line to Kinsella district for natural gas transmission, about 14 miles, of which six miles will be 10¾-in. and remainder 6-in.; also plans pipe lines for extensions in local distribution system at Edmonton.

Metropolitan Water District, Los Angeles, has awarded contracts on Burbank-Santa Monica distribution line (Specifications 333) to United Concrete Pipe Corp., South Gate, Cal., low bidder on Schedule 31, covering 5.8 miles, under lock-joint steel cylinder reinforced precast concrete pipe alternate; and Artukovich Brothers, Hynes, Cal., low bidders on Schedules 32 and 33, covering remaining 10.2 miles, under cast iron pipe alternate. Under these alternates, Schedule 31 involves 912 tons of reinforcing steel and 1047 tons of steel plates; and Schedules 32 and 33 involves about 8000 tons of cast iron pipe.

Prices of Finished Iron and Steel...

Steel prices on these pages are f.o.b. basing points (in cents per lb.) unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, deductions, and in most cases freight absorbed to meet competition.

Basing Point → / Product ↓	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Pacific Ports, Cars	DELIVERED TO Detroit	New York	Philadelphia
SHEETS															
Hot rolled	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold rolled[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized (24 ga.)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling (20 ga.)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	
Long ternes[2]	3.80¢		3.80¢									4.55¢			
Wrought iron	4.75¢														
STRIP															
Hot rolled[3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢		
Cold rolled[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢)					2.90¢		
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢								
Commodity C-R	2.95¢			2.95¢			2.95¢	(Worcester = 3.35¢)					3.05¢		
TIN PLATE Standard cokes (Per 100-lb. base box)	$5.00	$5.00	$5.00						$5.10						
BLACK PLATE 29 gage[5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢ (10)			
TERNES, M'FG Special coated (Per base box)	$4.30		$4.30						$4.40						
BARS															
Carbon steel	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail steel[6]	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢					2.40¢	2.70¢			
Reinforcing (billet)[7]	1.90¢	1.90¢	1.90¢	1.90¢	1.90¢	1.90¢	1.90¢	1.90¢			2.25¢	2.30¢	2.00¢		
Reinforcing (rail)[7]	1.80¢	1.80¢	1.80¢	1.80¢	1.80¢	1.80¢	1.80¢				2.15¢	2.20¢	1.90¢		
Cold finished[8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢							2.70¢		
PLATES									(Coatesville and Claymont = 2.10¢)						
Carbon steel	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢			2.45¢	2.65¢		2.29¢	2.15¢
Wrought iron	3.80¢														
Floor plates	3.35¢	3.35¢									3.70¢	4.00¢		3.71¢	
SHAPES Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	(Bethlehem = 2.10¢)				2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL C-R															
0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester = 3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester = 4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester = 6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester = 8.55¢)								
WIRE[9]															
Bright	2.60¢	2.60¢		2.60¢	2.60¢										
Galvanized	2.60¢	2.60¢		2.60¢	2.60¢										
Spring	3.20¢	3.20¢		3.20¢	3.20¢										
PILING Steel sheet	2.40¢	2.40¢				2.40¢					2.85¢	2.95¢			
IRON BARS															
Common		2.25¢			(Terra Haute, Ind. = 2.15¢)										
Refined	3.75¢														
Wrought	4.40¢														

[1] Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base. [2] Unassorted 8-lb. coating. [3] Widths up to 12 in. [4] Carbon 0.25 per cent and less. [5] Applies to 29 gage within certain width and length limitations. [6] For merchant trade. [7] Straight lengths as quoted by distributers. [8] Also shafting. For quantities of 20,000 to 39,999 lb. [9] Carload lots to manufacturing trade. [10] Boxed.

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (Rerolling only). Prices delivered Detroit are $2 higher f.o.b. Duluth, billets only, $2 higher.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

Shell Steel

Basic open hearth shell steel f.o.b. Pittsburgh and Chicago.

	Per Gross Ton
3 in to 8 in.	$54.00
8 in. to 12 in.	52.00
12 in to 18 in.	54.00
18 in. and over	56.00

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting to length, or quantity. This type of steel is for hot rolled sections used for the making of shells and includes rounds, round squares, and special sections.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(No. 5 to 9/32 in.)	*Per Lb.*
Pittsburgh, Chicago, Cleveland	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.50c.
Galveston	2.25c.

9/32 in. to 47/64 in., $3 a net ton higher. Quantity extras apply.

ROOFING TERNE PLATE

(F.o.b. Pittsburgh; Package, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00
25-lb. coating I.C.	8.00	16.00
30-lb. coating I.C.	8.63	17.25
40-lb. coating I.C.	9.75	19.50

WIRE PRODUCTS

(To the Trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham)

	Base per Keg
Standard wire nails	$2.55
Coated nails	2.55
Cut nails, carloads	3.85

	Base per 100 Lb.
Annealed fence wire	$3.05

	Base Column
Woven wire fence*	67
Fence posts (carloads)	69
Single loop bale ties	56
Galvanized barbed wire†	70
Twisted barbless wire	70

*15½ gage and heavier. †On 80-rod spools in carload quantities.

Note: Birmingham base same on above items, except spring wire.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine and carriage bolts:	
½ in. and 6 in. and smaller	68½
Larger and longer up to 1 in.	66
1⅛ in. and larger	64
Lag bolts	66
Plow bolts, Nos. 1, 2, 3, and 7	68½
Hot pressed nuts; c.p.c., t-nuts; square, hex., blank or tapped:	
½ in. and smaller	67
9/16 in. to 1 in. inclusive	64
1⅛ in. to 1½ in. inclusive	62
1⅝ in. and larger	60

On above items, excepting plow bolts, additional allowance of 10 per cent for full container quantities.

On all of the above items there is an additional 5 per cent allowance for carload shipments.

Semi-fin. hexagon nuts	U.S.S.	S.A.E.
½ in. and smaller	67	70
9/16 to 1 in.	64	65
1⅛ in. through 1½ in.	62	62
1⅝ in. and larger	60	60

In full container lots, 10 per cent additional discount.

Stove bolts, packages, nuts loose	72½
Stove bolts in packages, with nuts attached, add 15% extra.	
Stove bolts in bulk	83½

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York, lots of 200 lb. or over.

Large Rivets

(½ in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$3.40

Small Rivets

(7/16 in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	65 and 10

Cap and Set Screws

	Per Cent Off List
Milled hexagon head, cap screws, 1 in. dia. and smaller	50 and 10
Milled headless set screws, cut thread ¼ in. and larger	64
3/16 in. and smaller	73
Upset hex. head cap screws U.S.S. or S.A.E. thread 1 in. and smaller	70
Upset set screws, cup and oval points	75
Milled studs	52

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

NON-FERROUS PRICES

Cents per lb. for early delivery

	June 26	June 27	June 28	June 29	July 1	July 2
Copper, Electrolytic[1]	11.50	11.50	11.50	11.50	11.50	11.50
Copper, Lake	11.50	11.50	11.50	11.50	11.50	11.50
Tin, Straits, New York	52.25	53.00	52.50	....	52.25	53.00
Zinc, East St. Louis[2]	6.25	6.25	6.25	6.25	6.25	6.25
Lead, St. Louis[3]	4.85	4.85	4.85	4.85	4.85	4.85

[1] Mine producers' quotations only, delivered Conn. Valley. Deduct ¼c. for approximate New York delivery price. [2] Add 0.39c. for New York delivery. [3] Add 0.15c. for New York delivery.

Warehouse Products

Cents per lb., Delivered

	New York	Cleveland
Tin		
Straits pig	53.50	56.50
Copper		
Lake	13.25	12.625
Electro	12.75	12.625
Castings	12.375	12.375
H. R. sheets*	20.12	20.12
Seamless tubes*	20.62	20.62
Brass		
Yellow, sheets*	18.56	18.56
Yellow, rods*	13.55	13.55
Seamless tubes*	21.31	21.31
Zinc		
Slabs	7.60	7.75
Sheets, No. 9 casks	12.00	12.00
Lead		
American pig	6.10	5.50
Bar	8.05	8.25
Cut sheets	8.25	8.25
Antimony		
Asiatic	16.00	17.00
Aluminum		
Virgin, 99%	20.50	21.50
No. 1 remelt., 98-99%	18.00	18.50
Solder		
½ and ½	32.25	32.50
Babbitt		
Anti-friction grade	22.25	22.00

Old Metals

Cents per lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators. Selling prices are those charged to consumers after the metal has been prepared for their use.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper		
Hvy. crucible	8.875	9.50
Hvy. and wire	7.875	8.25
Light and bottoms	6.875	7.375
Brass		
Heavy	4.875	5.375
Light	3.375	4.625
No. 1 yel. turn	4.50	5.50
No. 1 red or compo. turn	7.625	8.125
Hvy. mach. compo.	7.875	8.50
Lead		
Heavy	4.00	4.375
Aluminum		
Cast	8.50	9.50
Sheet	14.00	15.00
Zinc	3.25	4.00

Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered: virgin, 99 per cent plus, 19c.-20c. a lb.; No. 12 remelt No. 2 standard, 18c.-19c. a lb. NICKEL, electrolytic, 35c.-36c. a lb. base refinery, lots of 2 tons or more. ANTIMONY, prompt: Asiatic, 16.50c. a lb., New York; American, 13c. a lb., f.o.b. smelter. QUICKSILVER, $200 per flask of 76 lb. BRASS INGOTS, commercial 85-5-5-5, 12.25c. a lb.

*These prices, which are also for delivery from Chicago warehouses, are quoted with the following percentages allowed off for extras: on copper sheets, 33⅓; on brass sheets and rods, 40; on brass tubes, 33⅓, and copper tubes, 40.

ALLOY STEEL

Alloy Steel Blooms, Billets and Slabs

Base per gross ton, f.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo or Bethlehem.....$54.00

Alloy Steel Bars

Base per pound, f.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.

Open-hearth grade ..... 2.70c.
Delivered, Detroit ..... 2.80c.

S.A.E. Series Numbers	Alloy Differential, per 100 Lb.
2000 (1.5 Ni)	$0.35
2100 (1.5 Ni)	0.75
2300 (3.5 Ni)	1.55
2500 (5 Ni)	2.25
3100 Ni-Cr	0.70
3200 Ni-Cr	1.35
3300 Ni-Cr	3.80
3400 Ni-Cr	3.20
4100 Cr-Mo (0.15 to 0.25 Mo.)	0.55
4100 Cr-Mo (0.25 to 0.40 Mo.)	0.75
x4340 Cr-Ni-Mo	1.65
4340 Cr-Ni-Mo	1.85
4600 Ni-Mo (0.2-0.3 Mo, 1.5-2 Ni)	1.10
5100 (0.60-0.90 Cr)	0.35
5100 (0.80-1.10 Cr)	0.45
5100 Cr spring steel	0.15
52-100 Cr. (electric furnace)	2.60
6100 Cr-V bar	1.20
6100 Cr-V spring steel	0.85
Cr-Ni-V	1.50
C-V	0.85

The above differentials are for hot rolled finished products. The differential for most grades in electric furnace steel is 50c. higher. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base.

Alloy Cold-Finished Bars

Base per pound, f.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.35c. Delivered Detroit, 3.45c., carlots.

STAINLESS AND HEAT-RESISTANT ALLOYS

(Base prices, cents per lb., f.o.b. Pittsburgh)

Chromium-Nickel

No.	304	302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium

No.	410	430	442	446
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
H't strip	17.00c.	17.50c.	24.00c.	35.00c.
C'ld st.	22.00c.	22.50c.	32.00c.	52.00c.

TOOL STEEL

(F.o.b. Pittsburgh)

	Base per Lb.
High speed	67c.
High-carbon-chromium	43c.
Oil-hardening	24c.
Special	22c.
Extra	18c.
Regular	14c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c. a lb. higher.

ELECTRICAL SHEETS

(F.o.b. Pittsburgh)

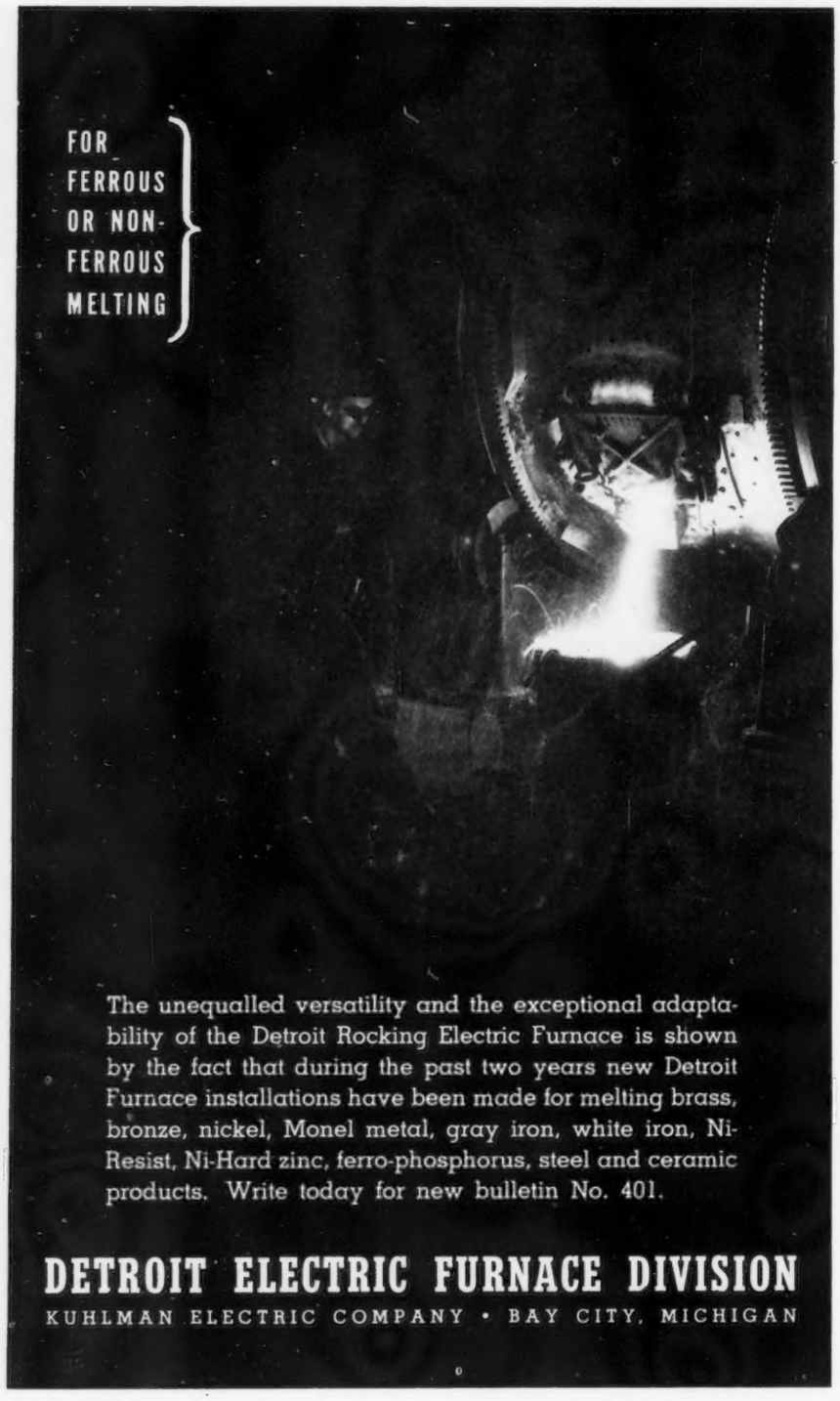
	Base per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

Silicon strip in coils—Sheet price plus silicon sheet extra width extra plus 25c. per 100 lb. for coils. Pacific ports add 70c. a 100 lb.

CAST IRON WATER PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham	46.00
6-in. and larger f.o.b. dock, San Francisco or Los Angeles or Seattle	56.00

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is $45 at Birmingham and $53.80 delivered Chicago.



The unequalled versatility and the exceptional adaptability of the Detroit Rocking Electric Furnace is shown by the fact that during the past two years new Detroit Furnace installations have been made for melting brass, bronze, nickel, Monel metal, gray iron, white iron, Ni-Resist, Ni-Hard zinc, ferro-phosphorus, steel and ceramic products. Write today for new bulletin No. 401.

DETROIT ELECTRIC FURNACE DIVISION

KUHLMAN ELECTRIC COMPANY • BAY CITY, MICHIGAN

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes. Minimum Wall.

(Net base prices per 100 ft., f.o.b. Pittsburgh, in carload lots)

	Seamless Cold Drawn	Seamless Hot Rolled	Lap Weld, Hot Rolled
1 in. o.d.13 B.W.G.	$9.01	$7.82	....
1¼ in. o.d.13 B.W.G.	10.67	9.26	....
1½ in. o.d.13 B.W.G.	11.70	10.23	$9.72
1¾ in. o.d.13 B.W.G.	13.42	11.64	11.06
2 in. o.d.13 B.W.G.	15.03	13.04	12.38
2¼ in. o.d.13 B.W.G.	16.76	14.54	13.79
2¼ in. o.d.12 B.W.G.	18.45	16.01	15.16
2½ in. o.d.12 B.W.G.	20.21	17.54	16.58
2¾ in. o.d.12 B.W.G.	21.42	18.59	17.54
3 in. o.d.12 B.W.G.	22.48	19.50	18.35
3½ in. o.d.11 B.W.G.	28.37	24.62	23.15
4 in. o.d.10 B.W.G.	35.20	30.54	28.66
4½ in. o.d.10 B.W.G.	43.04	37.35	35.22
5 in. o.d. 9 B.W.G.	54.01	46.87	44.25
6 in. o.d. 7 B.W.G.	82.93	71.96	68.14

Extras for less carload quantities:

40,000 lb. or ft. over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2.000 lb. or ft.	65%

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought iron pipe)

Base Price=$200 Per Net Ton

Butt Weld

Steel	Black	Galv.
⅛ in.	56	36
¼ to ⅜ in.	59	43½
½ in.	63½	54
¾ in.	66½	58
1 to 3 in.	68½	60½

Wrought Iron	Black	Galv.
¼ and ⅜ in.	+9	+30
½ in.	24	6½
¾ in.	30	13
1 and 1¼ in.	34	19
1½ in.	38	21½
2 in.	37½	21

Lap Weld

Steel		
2 in.	61	52½
2½ and 3 in.	64	55½
3½ to 6 in.	66	57¼
7 and 8 in.	65	55½
9 and 10 in.	64½	55
11 and 12 in.	63½	54

Wrought Iron		
2 in.	30½	15
2½ to 3½ in.	31½	17½
4 in.	33½	21
4½ to 8 in.	32½	20
9 to 12 in.	28½	15

Butt weld, extra strong, plain ends

Steel	Black	Galv.
⅛ in.	54½	41½
¼ to ⅜ in.	56½	45½
½ in.	61½	53½
¾ in.	65½	57½
1 to 3 in.	67	60
Wrought Iron		
¼ and ⅜ in.	+10	+43
½ in.	25	9
¾ in.	31	15
1 to 2 in.	38	22½

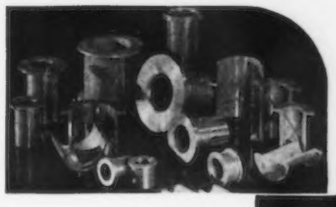
Lap weld, extra strong, plain ends

Steel		
2 in.	59	51½
2½ and 3 in.	63	55½
3½ to 6 in.	66½	59
7 and 8 in.	65½	56
9 and 10 in.	64½	55
11 and 12 in.	63½	54
Wrought Iron		
2 in.	33½	18½
2½ to 4 in.	39½	25½
4½ to 6 in.	37½	24
7 and 8 in.	38½	24½
9 to 12 in.	32	20½

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher, on all butt weld 8 in. and smaller.

SLEEVE BEARINGS



any TYPE

any SIZE

any QUANTITY

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Sleeve Bearing Data Sheets for your file folder. Containing a wealth of information for all users of bearings. Write today for your FREE copy.

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And size is no handicap. As small as jewelry — as large as sewer pipes, our facilities are complete in every respect.

Whether you order 1, 100, or 1,000,000, makes little difference. We attach the same sense of responsibility, the same exacting treatment to every order. As manufacturers of every known type, we can give you competent bearing advice free from prejudice. Why not try Johnson Bronze?

JOHNSON BRONZE

Sleeve BEARING HEADQUARTERS

505 S. MILL STREET • NEW CASTLE, PA.

ORES

Lake Superior Ores

Delivered Lower Lake Ports

Per Gross Ton

Old range, bessemer, 51.50%..	$4.75
Old range, non-bessemer, 51.50%	4.60
Mesaba, bessemer, 51.50%....	4.60
Mesaba, non-bessemer, 51.50%	4.45
High phosphorus, 51.50%.....	4.35

Foreign Ores*

C.i.f. Philadelphia or Baltimore, Exclusive of Duty

Per Unit

Algerian, low P, Cu free, dry, 55 to 58% Fe	Nom.
Caucasian, washed, 52% Mn.	Nom.
African, Indian, 44 to 48% Mn.	Nom.
African, Indian, 49 to 51% Mn.	Nom.
Brazilian, 46 to 48% Mn.	52c.
Cuban, del'd, duty free, 51% Mn.	72c.

Per Short Ton Unit

Tungsten, Chinese, Wolframite, duty paid, delivered	$23.50
Tungsten, domestic scheelite, delivered	23.50
Chrome ore, lump c.i.f. Atlantic Seaboard, per gross ton:	
South African (low grade)	Nom.
Rhodesian, 45%	$24.00
Rhodesian, 48%	28.50

*All foreign ore prices are nominal. War conditions have prevented trading in Swedish and Turkish ores and all quotations have therefore been withdrawn.

PARISH STAMPINGS *Travel Light*

CARLINE BRACKET — Used for connection between side posts and roof carlines in body frame construction of present type trailers.

Buses, trailers, railroad cars, and all transportation units, earn dividends through light weight construction. This is made possible by using high strength, corrosion resistance stampings.

To witness:—These brackets made by Parish are of .050" Ga. and 3/16" High Tensile Steel. They bring sturdy endurance, increased pay-load capacity to trailers.

Parish engineers can bring an added value to your product. Let us show you how.

PARISH *Specialists in* STAMPINGS *of Distinction*

PARISH PRESSED STEEL CO.

READING, PENNA.

Pacific Coast Representative
F. Somers Peterson Co.,
57 California St.,
San Francisco, California

SPRING BRACKET — For trailer, made of several pressed steel plates welded to form the assembly shown. Lighter and Stronger.

RAILS, TRACK SUPPLIES

F.o.b. Mill

Standard rails, heavier than 60 lb., gross ton	$40.00
Angle bars, 100 lb.	2.70

F.o.b. Basing Points

Light rails (from billets), gross ton	$40.00
Light rails (from rail steel), gross ton	39.00

Base per Lb.

Cut spikes	3.00c.
Screw spikes	4.55c.
Tie plates, steel	2.15c.
Tie plates, Pacific Coast	2.30c.
Track bolts, steam railroads	4.15c.
Track bolts, discount to jobbers all sizes (per 100 counts)	65-5

Basing points, light rails—Pittsburgh, Chicago, Birmingham; spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minneaqua, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo; spikes alone—Youngstown, Lebanon, Pa., Richmond, Va.

FLUORSPAR

Per Net Ton

Domestic washed gravel, 85-5, f.o.b. Kentucky and Illinois mines, all rail	$20.00
Domestic, f.o.b. Ohio River landing barges	20.00
No. 2 lump, 85-5 f.o.b. Kentucky and Illinois mines	$20.50 to 21.00
Foreign, 85% calcium fluoride, not over 5% Si., c.i.f. Atlantic ports, duty paid	$25.00 to $25.50
Domestic No. 1 ground bulk, 96 to 98%, calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	$31.00
As above, in bags, f.o.b. same mines	$32.60

REFRACTORIES

Fire Clay Brick

Per 1000 f.o.b. Works

Super-duty brick, at St. Louis	$60.80
First quality Pennsylvania, Maryland, Kentucky, Missouri and Illinois	47.50
First quality, New Jersey	52.50
Second quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	42.75
Second quality, New Jersey	49.00
No. 1 Ohio	39.90
Ground fire clay, per ton	7.10

Silica Brick

Pennsylvania	$47.50
Chicago District	55.10
Birmingham	47.50
Silica cement, net ton (Eastern)	8.55

Chrome Brick

Net per Ton

Standard f.o.b. Baltimore, Plymouth Meeting and Chester	$50.00
Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	50.00

Magnesite Brick

Standard f.o.b. Baltimore and Chester	$72.00
Chemically bonded, f.o.b. Baltimore	61.00

Grain Magnesite

Imported, f.o.b. Baltimore and Chester, Pa. (in sacks)	(—)*
Domestic, f.o.b. Baltimore and Chester in sacks	$40.00
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

*None available.

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

	Per Gross Ton
Domestic, 80% (carload)	$120.00

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$36.00
Domestic, 26 to 28%	49.50

Electric Ferrosilicon

Per Gross Ton, Delivered, Lump Size

50% (carload lots, bulk)	$74.50*
50% (ton lots, packed)	87.00*
75% (carload lots, bulk)	135.00*
75% (ton lots, packed)	151.00*

Bessemer Ferrosilicon

Per Gross Ton, F.o.b. Jackson, Ohio

10.00 to 10.50%	$33.50

For each additional 0.50% silicon up to 12%, 50c. per ton is added. Above 12% add 75c. per ton.

For each unit of manganese over 2%, $1 per ton additional.

Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Silvery Iron

Per Gross Ton, F.o.b. Jackson, Ohio

5.00 to 5.50%	$27.50

For each additional 0.5% silicon up to 12%, 50c. a ton is added. Above 12% add 75c. a ton.

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Manganese, each unit over 2%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

Ferrochrome

Per Lb. Contained Cr., Delivered Carlots, Lump Size, on Contract

4 to 6% carbon	11.00c.
2% carbon	17.50c.
1% carbon	18.50c.
0.10% carbon	20.50c.
0.06% carbon	21.00c.

Spot prices are ¼c. per lb. of contained chromium higher.

Silico-Manganese

Per Gross Ton, Delivered, Lump Size, Bulk, on Contract

3% carbon	$113.00*
2.50% carbon	118.00*
2% carbon	123.00*
1% carbon	133.00*

Other Ferroalloys

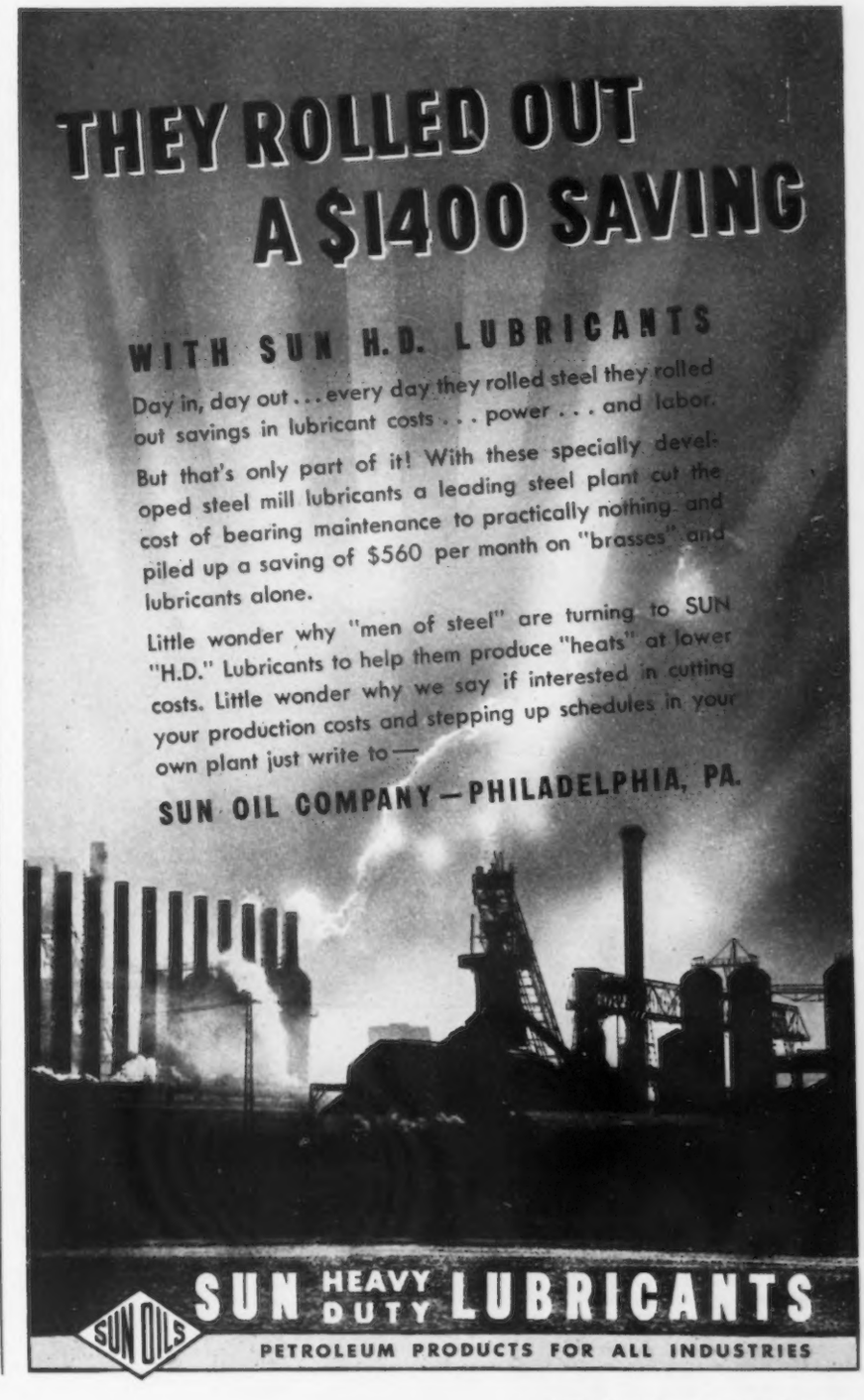
Ferrotungsten, per lb. contained W, del. carload	$2.00
Ferrotungsten, 100 lb. and less	2.25
Ferrovanadium, contract, per lb. contained V., del'd	$2.70 to $2.90†
Ferracolumbium, per lb. contained columbium, f.o.b. Niagara Falls, N. Y., ton lots	$2.25†
Ferrocarbontitanium, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace, carload and contract, per net ton	$142.50
Ferrocarbontitanium, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract, per net ton	$157.50
Ferrophosphorus, electric or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with $3 unitage, freight equalized with Rockdale, Tenn., per gross ton	$58.50
Ferrophosphorus, electrolytic 23-26% in carlots, f.o.b. Monsanto (Siglo), Tenn., 24%, per gross ton, $3 unitage, freight equalized with Nashville	$75.00
Ferromolybdenum, per lb. Mo, f.o.b. furnace	95c.
Calcium molybdate, per lb. Mo, f.o.b. furnace	80c.
Molybdenum oxide briquettes 48-52% Mo, per lb. contained Mo, f.o.b. Langeloth, Pa.	80c.

*Spot prices are $5 per ton higher.

†Spot prices are 10c. per lb. of contained element higher.

FUEL OIL

	Per Gal.
No. 3, f.o.b. Bayonne, N. J.	4.75c.
No. 6, f.o.b. Bayonne, N. J.	3.21c.
No. 5 Bur. Stds., del'd Chicago	3.25c.
No. 6 Bur. Stds., del'd Chicago	2.75c.
No. 3 distillate, del'd Cleveland	5.25c.
No. 4 industrial, del'd Cleveland	5.00c.
No. 5 industrial, del'd Cleveland	3.75c.
No. 6 industrial, del'd Cleveland	3.25c.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WITH SUN H.D. LUBRICANTS
Day in, day out... every day they rolled steel they rolled out savings in lubricant costs... power... and labor.
But that's only part of it! With these specially developed steel mill lubricants a leading steel plant cut the cost of bearing maintenance to practically nothing and piled up a saving of $560 per month on "brasses" and lubricants alone.
Little wonder why "men of steel" are turning to SUN "H.D." Lubricants to help them produce "heats" at lower costs. Little wonder why we say if interested in cutting your production costs and stepping up schedules in your own plant just write to—
SUN OIL COMPANY—PHILADELPHIA, PA.
SUN OILS
SUN HEAVY DUTY LUBRICANTS
PETROLEUM PRODUCTS FOR ALL INDUSTRIES

COKE

Per Net Ton

Furnace, f.o.b. Connellsville, prompt .....$4.00 to $4.25

Foundry, f.o.b. Connellsville, prompt .....$5.25 to 5.50

F'dry, by-product, Chicago.... 10.50

F'dry, by-product, New England 12.50

Foundry, by-product, Newark or Jersey City .....$11.30 to $11.90

F'dry, by-product, Philadelphia 11.13

F'dry, by-product, Cleveland... 11.05

F'dry, by-product, Cincinnati.. 10.50

Foundry, Birmingham 7.50

F'dry, by-product, St. Louis $10.75 to $11.00

Foundry, from Birmingham, f.o.b. cars dock Pacific ports.....$14.75

BRITISH

British

Per Gross Ton, f.o.b. United Kingdom Ports

Ferromanganese, export. £17 18s.

Tin plate, per base box 32s. to 33s.

Steel bars, open hearth £13 9s.

Beams, open hearth.... £12 2s. 6d.

Channels, open hearth.. £12 2s. 6d.

Angles, open hearth.... £12 2s. 6d.

Black sheets, No. 24 gage £17 max.*; £17 min.**

Galvanized sheets, No. 24 gage £19 10s. max.*; £19 10s. min.**

*Empire markets only.
**Other than Empire markets.

PIG IRON (Per Gross Ton)

Prices delivered various consuming points indicated by bold italics

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phos.
Boston	***$24.50***	***$24.00***	***$25.50***	***$25.00***	.....
Brooklyn	***26.50***	.....	.....	***27.00***	.....
Jersey City	***25.53***	***25.03***	***26.53***	***26.03***	.....
Philadelphia	***24.84***	***24.34***	***25.84***	***25.34***	.....
Bethlehem, Pa.	$24.00	$23.50	$25.00	$24.50	.....
Everett, Mass.	24.00	23.50	25.00	24.50	.....
Swedeland, Pa.	24.00	23.50	25.00	24.50	.....
Steelton, Pa.	.....	23.50	.....	.....	28.50
Birdsboro, Pa.	24.00	23.50	25.00	24.50	28.50
Sparrows Point, Md.	24.00	23.50	.....	.....	.....
Erie, Pa.	23.00	22.50	24.00	23.50	.....
Neville Island, Pa.	23.00	22.50	23.50	23.00	.....
Sharpsville, Pa.	23.00	22.50	23.50	23.00	.....
Buffalo	23.00	22.00	24.00	23.50	28.50
Cincinnati	***23.44***	***23.61***	.....	***24.11***	.....
Canton, Ohio	***24.39***	***23.89***	***24.89***	***24.39***	.....
Mansfield, Ohio	***24.94***	***24.44***	***25.44***	***24.94***	.....
St. Louis	***23.50***	***23.02***	.....	.....	.....
Chicago	23.00	22.50	23.50	23.00	.....
Granite City, Ill.	23.00	22.50	23.50	23.00	.....
Cleveland	23.00	22.50	23.50	23.00	.....
Hamilton, Ohio	23.00	22.50	.....	23.00	.....
Toledo	23.00	22.50	23.50	23.00	.....
Youngstown	23.00	22.50	23.50	23.00	.....
Detroit	23.00	22.50	23.50	23.00	.....
St. Paul	***25.63***	.....	***26.13***	***25.63***	.....
Duluth	23.50	.....	24.00	23.50	.....
Birmingham	19.38*	18.00	24.00	.....	.....
Los Angeles, San Francisco and Seattle	***27.50***	.....	.....	.....	.....
Provo, Utah	22.00	.....	.....	.....	.....
Montreal†	27.50	27.50	.....	28.00	.....
Toronto†	25.50	25.50	.....	26.00	.....

GRAY FORGE

Valley or Pittsburgh fce.....$22.50

CHARCOAL

Lake Superior fce.....$27.00
Delivered Chicago 30.34

Base prices are subject to an additional charge for delivery within the switching limits of the respective districts.

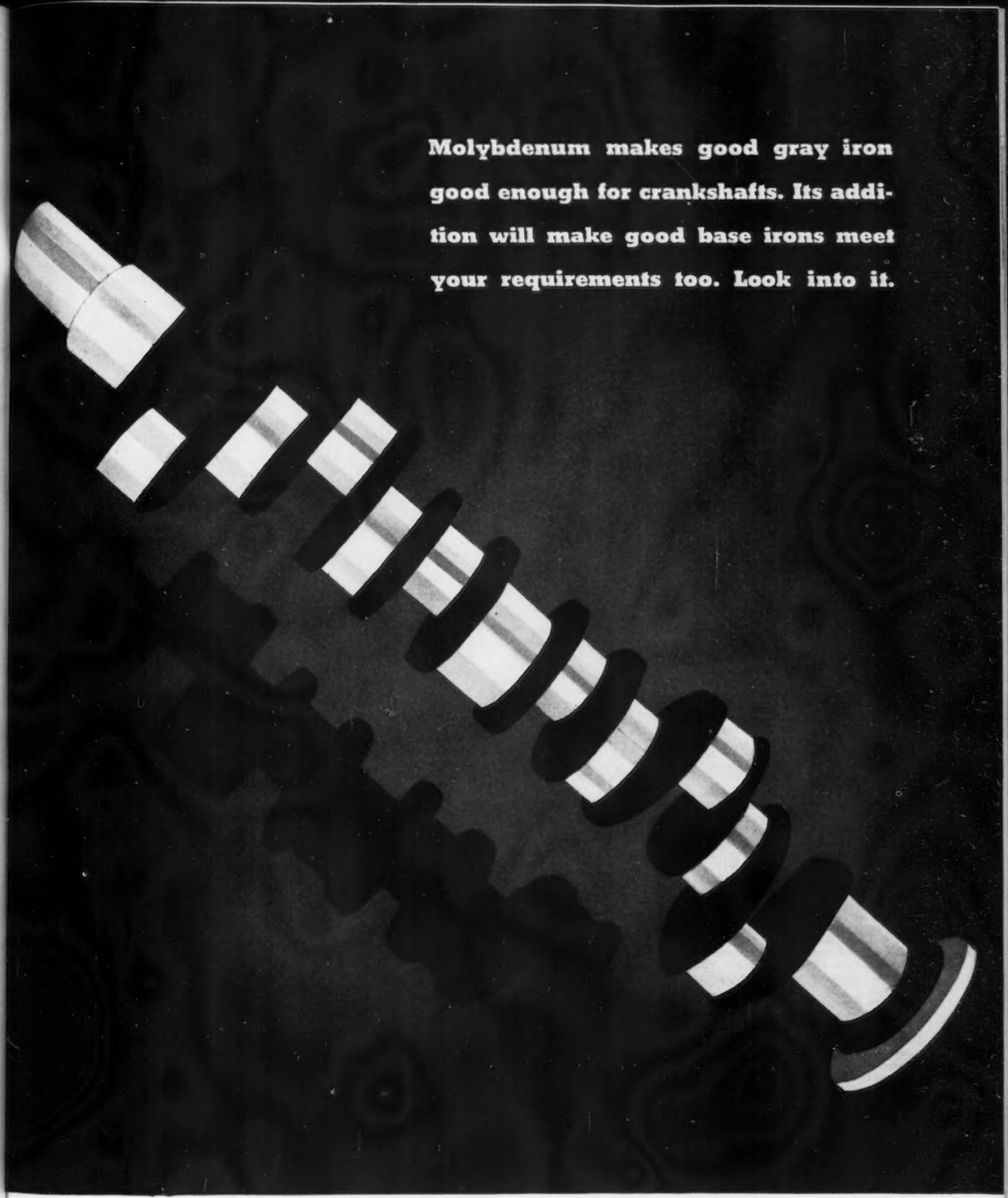
*Delivered prices on Southern iron for shipment to Northern points are 38c. a ton below delivered prices from nearest Northern basing point on iron with phosphorus content of 0.70 per cent and over. †On all grades 2.25 per cent silicon and under is base. For each 25 points of silicon over 2.25 per cent an extra of 25c. is charged.

WAREHOUSE PRICES

(Base Prices, Dollars per 100 lb., Delivered Metropolitan Areas)

	Pittsburgh	Chicago	Cleveland	Philadelphia	New York	Detroit	Buffalo	Boston	Birmingham	St. Louis	St. Paul	Milwaukee	Los Angeles
Sheets, hot rolled	$3.15	$3.05	$3.15	$3.35	$3.38	$3.23	$3.05	$3.51	$3.45	$3.18	$3.30	$3.48	$4.10
Sheets, cold rolled	....	4.10	4.05	4.05	4.40	4.30	4.30	4.58	....	4.12	4.35	4.43	6.30
Sheets, galvanized	4.75	4.60	4 42	4.50	4.30	4.64	4.45	4.66	4.75	4.95	5.00	4.98	5.25
Strip, hot rolled	3.40	3.40	3.30	3.75	3.76	3.48*	3.62	3.86	3.70	3.52	3.65	3.73	....
Strip, cold rolled	3.20	3.30	3.20	3.3i	3.31	3.20	3.22	3.26	....	3.41	3.63	3.54	....
Plates	3.40	3.55	3.40	3.55	3.76	3.60	3.62	3.85	3.35	3.47	3.80	3.68	4.00
Structural shapes	3.40	3.55	3.58	3.55	3.75	3.65	3.40	3.85	3.55	3.47	3.80	3.68	4.00
Bars, hot rolled	3.35	3.50	3.25	3.85	3.84	3.43	3.35	3.98	3.50	3.62	3.75	3.63	4.15
Bars, cold finished	3.65	3.75	3.75	4.06	4.09	3.80	3.75	4.13	4.43	4.02	4.34	3.88	6.60
Bars, ht. rld. SAE 2300	7.20	7.10	7.30	7.31	7.35	7.42	7.10	7.50	....	7.47	7.45	7.33	9.40
Bars, ht. rld. SAE 3100	5.75	5.65	5.85	5.86	5.90	5.97	5.65	6.05	....	6.02	6.00	5.88	8.55
Bars, cd. drn. SAE 2300	8.15	8.15	8.15	8.56	8.59	8.45	8.15	8.63	....	8.52	8.84	8.38	10.65
Bars, cd. drn. SAE 3100	6.75	6.75	6.75	7.16	7.19	7.05	6.75	7.23	....	7.12	7.44	6.98	9.80

BASE QUANTITIES: Hot rolled sheets, cold rolled sheets, hot rolled strip, plates, shapes and hot rolled bars, 400 to 1999 lb.; galvanized sheets, 150 to 1499 lb.; cold rolled strip, extras apply on all quantities; cold finished bars, 1500 lb. and over; SAE bars, 1000 lb. and over. Exceptions: Chicago, galvanized sheets, 500 to 1499 lb.; Philadelphia, galvanized sheets, one to nine bundles, cold rolled sheets, 1000 to 1999 lb.; Detroit, galvanized sheets, 500 to 1499 lb.; Buffalo, cold rolled sheets, 500 to 1500 lb., galvanized sheets, 450 to 1499 lb.; Boston, cold rolled and galvanized sheets, 450 to 3749 lb.; Birmingham, hot rolled sheets, strip and bars, plates and shapes, 400 to 3999 lb., galvanized sheets, 500 to 1499 lb.; St. Louis, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 500 to 1499 lb.; Milwaukee, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 150 to 499 lb.; New York, hot rolled sheets, 0 to 1999 lb., cold rolled sheets, 400 to 1499 lb.; St. Paul, galvanized and cold rolled sheets, any quantity, hot rolled bars, plates, shapes, hot rolled sheets, 400 to 14,999 lb.; Los Angeles, hot rolled sheets, bars, plates, shapes, cold rolled sheets, 300 to 1999 lb., galvanized sheets, 150 to 1049 lb. Extras for size, quality, etc., apply on above quotations. *12 gage and heavier, $3.23.



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Sales Possibilities

. . . CONSTRUCTION, PLANT EXPANSION AND EQUIPMENT BUYING

North Atlantic

• **Edo Aircraft Corp.,** College Point, Long Island, N. Y., seaplane equipment, has let general contract to Brown & Matthews, Inc., 122 East Forty-second Street, New York, for one and two-story addition, 100 x 200 ft., and new boiler house. Cost close to $125,000 with equipment. Evans, Moore & Woodbridge, 101 Park Avenue, New York, are architects.

Marianna Smokeless Coal Co., care of Pond Creek Pocahontas Co., 20 Exchange Place, New York, recently organized as a subsidiary of latter company, with capital of $500,000, has leased about 6000 acres of coal lands near Pineville, Wyoming County, W. Va., and will begin immediate development. Mining machinery will be installed for two veins, with steel tipples, mechanical-washing and cleaning plant, machine shop, power house and other structures. Cost over $450,000. Both companies mentioned are affiliated with Island Creek Coal Co., first noted address, and R. & P. Building, Huntington, W. Va., which will be active in project. James D. Francis is president of Pond Creek and Island Creek companies.

Texas Co., 135 East Forty-second Street, New York, has approved plans for expansion and improvements in oil refinery at Port Arthur, Tex., including equipment in lubricating oil-processing division and other departments. Award for certain special equipment has been made to Lummus Co., 420 Lexington Avenue, New York, and contracts for other facilities will be let soon. Cost over $300,000 with machinery.

Department of Docks, Pier A, North River, New York, has let general contract to James Stewart & Co., 230 Park Avenue, for new steel hangar, No.. 8, at LaGuardia Field, Queens, at $516,480, exclusive of equipment. Cost over $750,000 with reconditioning and other operating facilities.

Continental Oil Co., 10 Rockefeller Plaza, New York, is awarding contracts for new oil refinery at Westlake, near Lake Charles, La., including grading of site to Williams Brothers Corp., Second National Bank Building, Houston, Tex.; and for skimming, cracking and polymerization equipment to M. W. Kellogg Co., 225 Broadway, New York. Plant will comprise large units for production of high-test gasoline and by-products. Cost close to $5,000,000 with equipment. Company also has begun expansion at refinery at Ponca City, Okla., to include new unit for solvent treatment and dewaxing of lubricating oils, with steel tank storage extensions and other facilities. Cost over $1,000,000 with machinery.

General Electric Co., Schenectady, N. Y., has approved plans for one-story addition to branch plant at Lynn, Mass. Cost over $100,000 with equipment.

Jacobs Brothers Co., 1 Main Street, Brooklyn, manufacturer of commercial scales, store equipment, etc., has leased about 75,000 sq. ft. additional space in Gair Terminal Building for expansion, providing about 150,000 sq. ft. for company plant.

Wright Aeronautical Corp., 132 Beckwith Avenue, Paterson, N. J., affiliated with Curtiss-Wright Corp., 30 Rockefeller Plaza, New York, has acquired adjoining property, 30 city lots in all, for several one-story additions for expansion in parts production and assembling divisions, test cell units and other structures. Cost over $300,000 with equipment. Parent company noted also will carry out larger plant unit for Curtiss-Wright Propeller Division, Clifton, N. J., at Caldwell Township, adjoining Caldwell-Wright airport, recently noted in these columns, comprising a one-story unit, about 230,000 sq. ft. floor space for parts manufacture and assembling. Cost over $500,000 with equipment. Albert Kahn, Inc., New Center Building, Detroit, is architect and engineer for last noted plant.

Public Works Officer, Navy Yard, Philadelphia, has let general contract to Ralph S. Herzog, 1505 Race Street, for one-story machine shop addition at $217,890 exclusive of equipment (Specifications 9405). Bids are being asked until July 10 for 10,000-lb. freight elevator, with controls, automatic doors and accessories for material assembling shop (Specifications 9583), and for heating installation, including exterior underground service lines for same building (Specifications 9582).

Atlantic Refining Co., 260 South Broad Street, Philadelphia, has approved plans for new bulk oil terminal at Fort Mifflin, Delaware River, for handling crude oil tanker shipments, including tank units with capacity of 320,000 bbl., pumping station and other structures. Cost over $100,000 with equipment.

Buffalo District

• **Worthington Pump & Machinery Corp.,** Clinton and Roberts Streets, Buffalo, has let general contract to Austin Co., Cleveland, for one-story addition, 115 x 145 ft. Cost over $85,000 with equipment. Main offices are at Harrison, N. J.

Liquid Veneer Corp., 371-77 Ellicott Street, Buffalo, polishes, has purchased three-story building at Urban and Kehr Streets, about 50,000 sq. ft. floor space, for plant. Present works will be removed to new location and equipment purchased to increase capacity about 25 per cent.

Harrison Radiator Corp., Lockport, N. Y., automobile radiators, plans one-story addition. Cost close to $50,000 with equipment.

New England

• **Wyman-Gordon Co., Inc.,** Madison Street, Worcester, Mass., forgings, has let general contract to E. J. Cross Co., 150 Prescott Street, for one-story addition, 65 x 153 ft. Cost close to $65,000 with equipment.

Public Works Officer, Naval Station, Portsmouth, N. H., asks bids (no closing date stated) for one-story addition to machine shop (Specifications 9931).

Bullard Co., Eighth Street, Bridgeport, Conn., machine tools and parts, has let general contract to Turner Construction Co., 420 Lexington Avenue, New York, for one-story addition, 100 x 175 ft., to be used as a machine shop. Cost over $100,000 with equipment, which will include a 40-ft. span traveling crane and other mechanical-handling facilities. Company is erecting two-story addition, 94 x 360 ft., with basement and subbasement, for which general contract recently was let to same company. Cost over $150,000 with equipment. Alexander D. Crosett, 512 Fifth Avenue, New York, is engineer.

Mason-Neilan Regulator Co., Pierce Square, Dorchester, Boston, valves, regulators, governors, etc., for steam power plants, has let contract to Austin Co., Cleveland, for one-story addition. Cost close to $50,000 with equipment.

Washington District

• **Bureau of Yards and Docks,** Navy Department, Washington, will ask bids soon for two-story mechanical and utility shop at local Navy yard (Specifications 9885). General contract has been let to George Hyman Construction Co., Seventh and T Streets, N.E., for one-story addition to machine shop building No. 159 at yard, on bid of $322,000 exclusive of equipment (Specifications 9832). Fund of $2,326,000 is being secured through new Naval appropriation bill for expansion at Marine Barracks Flying Field, Quantico, Va., to include hangars, shops, engine test buildings and other structures.

City Council, Hagerstown, Md., plans installation of two new boiler units and auxiliary equipment in municipal power plant, where expansion and improvements will be made. Cost about $260,000. Wood & Kirkpatrick, Stock Exchange Building, Philadelphia, are consulting engineers.

General Purchasing Officer, Panama Canal, Washington, asks bids until July 8 for annealed cable, apparatus-type cable, toggle switches, control switches and other equipment (Schedule 4126), 75,000 ft. of copper wire cloth (Schedule 4129).

Board of Directors, Charlotte Hall Military Academy, Charlotte Hall, Md., has let general contract to Standard Construction Co., Inc., 416 Fifth Street, N.W., Washington, for one-story industrial arts building. Cost over $75,000 with equipment.

Roanoke Gas Co., Roanoke, Va., will make extensions and improvements in coal-gas manufacturing plant, including additional equipment. Contract has been let to West Gas Improvement Co. of America, Inc., 424 Madison Avenue, New York, for two vertical retorts. Extensions will be made in pipe lines. Cost about $125,000.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until July 9 for pipe and bolt-threading machine (Schedule 2110), pebble mill machines (Schedule 2088), woodworking machine (Schedule 2111), safety belt-testing machine (Schedule 2086), sander (Schedule 2092), all motor-driven; metal clothes' lockers (Schedule 2140); until July 12, portable weighing airplane scales (Schedule 2164), wire rope (Schedule 2160) for Eastern and Western Navy yards.

Bureau of Yards and Docks, Navy Department, Washington, is securing fund of about $35,000,000 through new naval appropriation bill, for expansion and improvements in Federal and private shipbuilding plants during fiscal year closing June 30, 1941, including installation of cranes, hoists and other mechanical-handling equipment. A further fund of $50,000,000 is being considered by House Naval Affairs Committee for like purpose, a considerable part to be expended during fiscal year noted.

South Atlantic

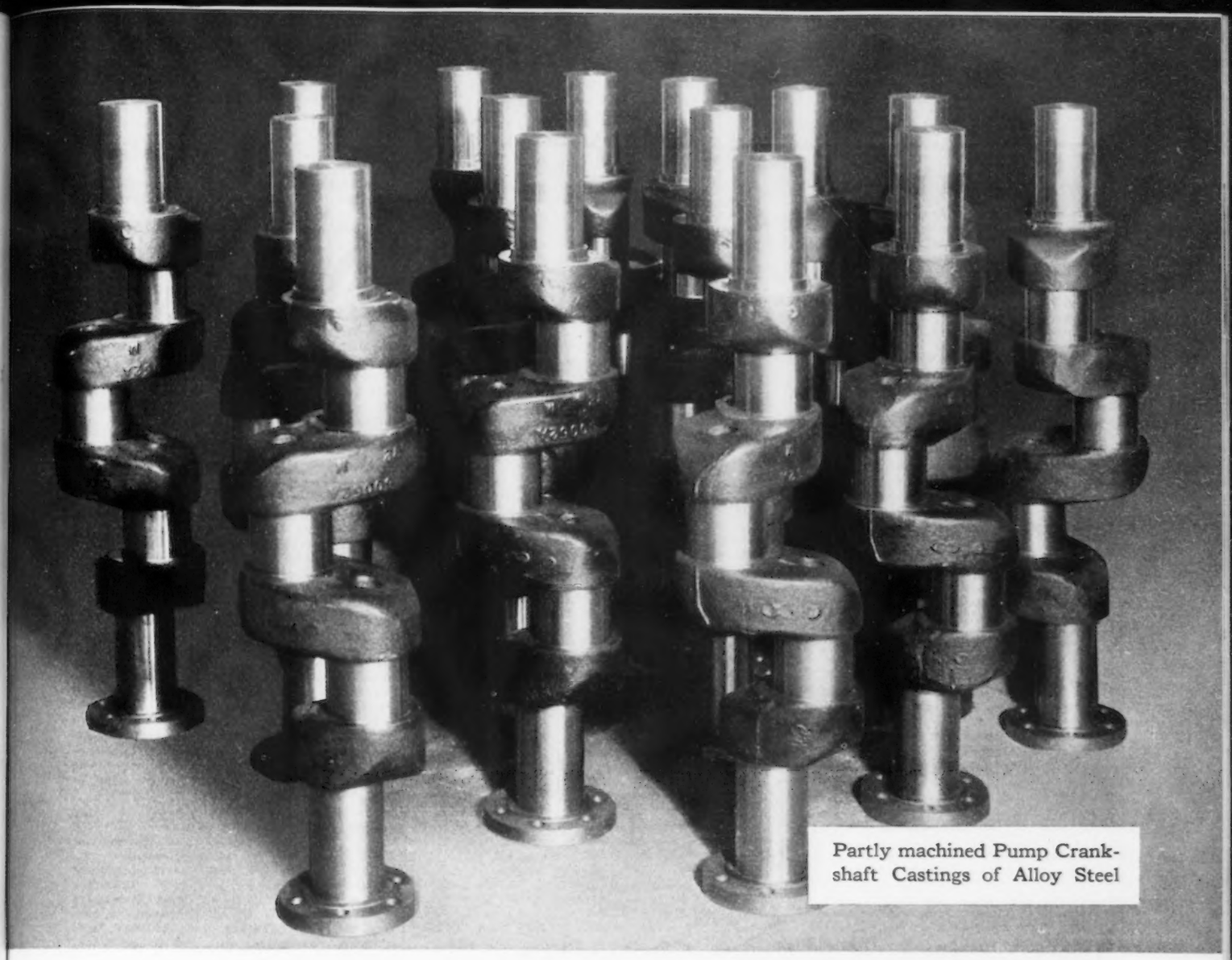
• **Container Corp. of America, Inc.,** Fernandina, Fla., has let general contract to George D. Auchter Co., East Adams Street, Jacksonville, Fla., for one-story addition to sulphate pulp mill, used for fiber board production for container manufacture. Cost close to $60,000 with equipment. Main offices of company are at 111 West Washington Street, Chicago.

Construction Quartermaster, MacDill Field, Tampa, Fla., asks bids until July 19 for 500,000-gal. elevated steel tank and tower, with piping and accessories.

Public Works Officer, Naval Air Station, Pensacola, Fla., asks bids until July 17 for motor test stand building, including gasoline storage tanks, septic tank and other facilities (Specifications 9700).

South Central

• **Minneapolis-Moline Power Implement Co.,** Minneapolis, Minn., agricultural implements and parts, has leased one-story building to be erected by W. W. Robinson, Memphis, Tenn., on Olive Street, Memphis, for new factory branch, storage and distributing plant. Cost over $60,000 with equipment. Contract for erection has been let to Young & Maury, 554



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STEEL CASTINGS

Adams Street, Memphis. George Mahan, Jr., Sterick Building, Memphis, is architect.

Tennessee Valley Authority, Knoxville, Tenn., plans new hydroelectric power plant at place to be known as Cherokee Dam on Holston River, about 35 miles from Knoxville, to include power dam and generating station with initial capacity of 90,000-kw., switchyard and other structures, including transmission line connection with high-tension system. Also plans installation of two new hydraulic turbine-generator units at Wilson Dam hydroelectric power plant, and a similar generating unit at Pickwick Dam hydroelectric power plant. New steam-electric generating station is planned near Nashville, Tenn., for auxiliary service, with initial capacity of 120,000-kw. Entire project will cost about $65,000,000. National Defense Commission has made application to Congress for appropriation in that amount for project.

Southwest

• **Swift & Co.,** Cotton Oil Mill Division, 4115 South Packers Street, Chicago, have let contract to Muskogee Iron Works, Inc., Muskogee, Okla., for one-story cottonseed oil mill at Portageville, Mo., with auxiliary buildings for storage, distribution and other service. Cost close to $100,000 with presses, mechanical-handling and other equipment.

Stearman Aircraft Co., Wichita, Kan., airplanes and parts, plans six one-story additions for expansion in parts production and assembling departments. Cost over $100,000 with equipment. Overend & Boucher, Brown Building, are architects.

Board of Directors, Grand River Dam Authority, Vinita, Okla., asks bids until July 9 for pumping station and equipment. Holway & Neuffer, 302 East Eighteenth Street, Tulsa, Okla., are consulting engineers.

Armour & Co., Union Stock Yards, Chicago, have let general contract to Swenson Construction Co., Victor Building, Kansas City, Mo., for three-story addition to branch plant at Kansas City, Kan., 91 x 217 ft., and improvements in present structures. Cost about $300,000 with equipment, instead of smaller sum previously noted.

Lehigh Portland Cement Co., Iola, Kan., plans one-story addition, 42 x 215 ft., to mill, including cylindrical tanks and headhouse, for storage and distribution. Cost close to $125,000 with bins, mechanical-handling equipment and other facilities. Chalmers & Borton, Nelson Building, Hutchinson, Kan., are engineers. Main offices are at Allentown, Pa.

Bayonne Steel Barrel Co., Constable Hook, Bayonne, N. J., has acquired property on ship channel, Port Arthur, Tex., for new branch plant, comprising main one-story unit and smaller structures. Cost over $60,000 with equipment.

Western Pa. District

• **Westinghouse Electric & Mfg. Co.,** East Pittsburgh, has asked bids on general contract for one-story addition to branch plant at Sharon, Pa., used largely for electric transformer manufacture, 50 x 240 ft., for storage, distribution and other service. Cost over $65,000 with equipment. J. B. George, first noted address, is company engineer. Plans are under way for one-story factory branch, storage and distributing plant on Forrest Avenue, Atlanta, Ga. Cost over $400,000 with equipment. Atlanta offices of company are at 426 Marietta Street, N.W.

National Electric Coil Co., Bluefield Avenue, Bluefield, W. Va., has let general contract to Clarence Heldreth, Inc., Tazewell, Va., for one-story addition. Cost close to $40,000 with equipment.

Ohio and Indiana

• **Carlton Machine Tool Co.,** Meeker Street and Spring Grove Avenue, Cincinnati, has let general contract to Dawson-Evans Construction Co., 5300 Carthage Pike, St. Bernard, Ohio, for one-story addition, 90 x 100 ft., for expansion in machine shop. Cost about $45,000 with equipment.

Lees-Bradner Co., 6210 Carnegie Avenue, Cleveland, machine tools and parts, has let general contract to Steven J. Lucas, 13700 Melzer Avenue, for modernization and improvements in plant at West 121st Street and Elmwood Avenue, totaling 62,000 sq. ft. floor space, recently acquired for new works. Cost over $75,000 with equipment. Ernest McGeorge, East Ninety-third Street and Quincy Avenue, is consulting engineer.

Shellmar Products Co., Mount Vernon, Ohio, cellophane products, plans two-story addition, 125 x 200 ft., for expansion in converting department, with one-story adjoining unit, 21 x 80 ft., for auxiliary service. Cost over $125,000 with equipment. Main offices are at 234 South Michigan Avenue, Chicago.

Marmon-Herrington Co., Inc., Washington and Harding Streets, Indianapolis, motor trucks, tractors, tanks, etc., has let general contract to H. K. Ferguson Co., Hanna Building, Cleveland, for one-story addition, to double present capacity. Cost over $85,000 with equipment.

City Council, Warren, Ind., plans expansion and improvements in municipal power plant, installation to include new 450-hp. diesel engine-generator unit; 10,000-gal. oil storage tank, oil refining apparatus, switchboard, two 200-gal. per min. circulating pumps and auxiliary equipment. R. W. Noland, Medical Arts Building, Fort Wayne, Ind., is consulting engineer.

Michigan District

• **Chevrolet Motor Division,** Flint, Mich., plans one-story top addition to parts production and service building, about 60,000 sq. ft. of floor space. Cost over $125,000 with equipment.

Soss Mfg. Co., 105 Scotten Avenue, Detroit, automobile hardware and other metal products, has let general contract to W. E. Wood Co., 4649 Humboldt Street, for new one-story plant, 220 x 450 ft., on Hoover Road, near Detroit. Cost close to $250,000 with equipment. Smith, Hinchman & Grylls, Marquette Building, are architects and engineers. Main offices are at Roselle, N. J.

Houppert Winery Co., Lawton, Mich., plans rebuilding part of plant recently destroyed by fire. Loss close to $150,000 with equipment.

Detroit Gasket & Mfg. Co., 12640 Burt Road, Detroit, has asked bids on general contract for one-story addition, 100 x 730 ft., for storage and distribution. Cost over $100,000 with equipment. H. D. Ilgenfritz, 468 Prentiss Street, is architect.

Middle West

• **Campbell Soup Co.,** 2550 West Thirty-fifth Street, Chicago, has asked bids on general contract for five-story and basement addition, 100 x 120 ft. Cost over $200,000 with equipment. Battey & Childs, 231 South LaSalle Street, are architects and engineers. Main offices are at Camden, N. J.

Special Architectural Metal Co., Inc., 5512 Northwest Highway, Chicago, metal products, has purchased two-story and basement building, 50 x 125 ft., at 163-65 North Morgan Street, and will modernize for plant and remove to new location, increasing capacity.

Beloit Iron Works, Inc., 815 Second Street, Beloit, Wis., iron and steel products, has let general contract to Cunningham Brothers, 359 East Grand Avenue, for three-story addition, 65 x 125 ft. Cost over $70,000 with equipment.

Midland Rubber Co., 207-11 A Avenue, N.E., Cedar Rapids, Iowa, mechanical rubber goods, has asked bids on general contract for one-story addition, 60 x 150 ft., for production of both mechanical and molded rubber products. Cost about $45,000 with equipment.

City Council, Oelwein, Iowa, has plans for new municipal light and power plant. Cost about $590,000 with equipment. Special election has been called July 18 to approve bond issue in that amount. Hubbard Engineering Co., 415 North La Salle Street, Chicago, is consulting engineer.

Green Bay Drop Forge Co., 1341 South State Street, Green Bay, Wis., has begun superstructure for one-story addition, for which general contract recently was let to Selmer Co., Northern Building, to be used as a steel-treating unit. Harry W. Williams, Northern Building, is architect.

Oscar Mayer & Co., 1241 North Sedgwick Street, Chicago, meat packers, plan two-story and basement addition. Cost over $50,000 with equipment. Henschien, Everds & Crombie, 59 East Van Buren Street, are architects and engineers.

Pacific Coast

• **Swift & Co.,** Union Stock Yards, Chicago, meat packers, have let general contract to Howard Wright & Co., Inc., 407 Yale Street North, Seattle, for new one-story meat-processing, packing, storage and distribution plant, 150 x 340 ft., at 1050 Fourth Street, Seattle. Cost about $200,000 with equipment.

Air Transport Mfg. Co., Long Beach, Cal., airplanes and parts, care of Kenneth S. Wing, 501 Termino Avenue, architect, will ask bids soon on general contract for one-story plant, about 30,000 sq. ft. of floor space, for parts production and assembling, at local Dougherty Field. Cost close to $75,000 with equipment.

Bureau of Reclamation, Denver, asks bids until July 17 for one 115,000-hp. vertical-shaft hydraulic turbine, with oil-pressure, actuator-type governor and pressure regulator for unit A-5, Boulder power plant, Boulder Canyon project (Specifications 917).

Amalgamated Sugar Co., Ogden, Utah, plans one-story addition to beet sugar mill, for bagging, packing, storage and distribution. Cost close to $500,000 with equipment.

Richfield Oil Co., 901 Harrison Street, Seattle, has plans for new bulk oil storage and distributing plant on West Duwamish Waterway, Harbor Island, consisting of several one-story buildings, with 11 steel tank units of 500,000-bbl. capacity, boiler house, pumping station, loading racks, pier, 40 x 200 ft., and other structures. Cost about $160,000 with equipment. Main offices are at 555 South Flower Street, Los Angeles; J. J. Downey is company engineer in charge of marine terminals, last noted address.

Bureau of Yards and Docks, Navy Department, Washington, is securing appropriations for following extensions at naval torpedo station, Keyport, Wash.: One-story addition to overhaul shop, cost about $85,000 with equipment; igniter building and accessories, $45,000; one-story shop for overhaul and storage of exploders, $45,000; extension of fire protection system, $117,000. Fund of $19,750,000 is being arranged for new fleet operating base in San Pedro district, Los Angeles, with docks, buildings, shops, power house and other structures. Plans will be drawn soon.

Canada

• **Standard Railway Equipment Mfg. Co., Ltd.,** Lachine, Que., has asked bids on general contract for one-story addition. Cost close to $50,000 with equipment. Company is subsidiary of Standard Railway Equipment Co., Inc., Hammond, Ind.

Canadian Industries, Ltd., Montreal, has let general contract to Brookfield Construction Co., Ltd., Halifax, N. S., for one-story addition to commercial fertilizer plant at Halifax, 90 x 180 ft., for storage and distribution. Cost about $45,000 with bins and mechanical-handling equipment.

Steep Rock Iron Mines, Ltd., 25 King Street West, Toronto, plans expansion at iron ore-mining properties at Atikokan, Ont., including additional mining machinery, ore conveying and handling equipment, storage and distribution facilities, etc. Cost close to $100,000.